



FP7 ex post and H2020 interim evaluation of Marie Skłodowska-Curie actions (MSCA)

Final Report

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Table of Contents

Table of tables	7
Table of figures	11
Acronyms	13
Abstract	14
Executive summary	15
ES1 Overview of the Marie Skłodowska-Curie Actions	15
ES2 Method of approach and sources of evidence used	17
ES3 Conclusions and recommendations	17
1 Introduction	31
1.1 Marie Skłodowska-Curie actions	31
1.2 Objectives of the evaluation	32
1.3 Method of approach and sources of evidence	33
1.4 Programme objectives and intervention logic	35
1.5 Implementation state of play	40
2 Relevance of the MSCA programme	51
2.1 Relevance of the programme objectives with regards to global challenges in the EU	51
2.2 Cross-cutting issues	60
2.3 Relevance of programme objectives for specific stakeholders	61
3 Efficiency	66
3.1 Programme management and use of resources	66
3.2 Programme implementation	73
4 Effectiveness	84
4.1 Achieving programme specific objectives: strengthening skills, training and career development	84
4.2 Contributions to cross-cutting objectives of Horizon 2020	134
5 Coherence	138
5.1 Internal coherence: coherence with H2020	138
5.2 Internal coherence of MSCA	140
5.3 External coherence: coherence with other EU objectives, policies and legal framework	142
5.4 Funding instruments and tools	145
5.5 External coherence: coherence with Member States' interventions ..	146
6 EU added value	151
6.1 Analysis of EU added value	151
6.2 Are research collaborations long lasting?	157
7 Conclusions and recommendations	160
7.1 Relevance	160
7.2 Efficiency	164
7.3 Effectiveness	166
7.4 Coherence	171
7.5 EU added value	173
ANNEXES	175
Annex 1 Programme activities	176
Annex 2 Evaluation questions	182
Annex 3 Case study write-ups	185

Annex 4	Data tables from survey	302
Annex 6	Key References	312

Table of tables

Table 1.	Online surveys	34
Table 2.	Survey	34
Table 3.	MSCA specific objectives and cross-cutting objectives of Horizon 2020 ...	36
Table 4.	Implementation state of play - overview	41
Table 5.	Success rates and oversubscription in MSCA	42
Table 6.	MSCA applicants and participants in Horizon 2020, (+/- indicate change vis-à-vis FP7)	43
Table 7.	MSCA applicants and participants in FP7.....	43
Table 8.	Budget scenarios for MSCA under Horizon 2020, in EUR	78
Table 9.	Responses by type of action (only fellows): How would you rate the adequacy of the living allowance (COFUND, IF, and ITN) / top-up allowance (RISE)?	79
Table 10.	Responses to by actions (only fellows): To what extent were you satisfied with the training and professional development opportunities provided during your MSCA fellowship	85
Table 11.	Responses by action (only COFUND, IF and ITN fellows): How much formal training (courses) did you receive during the fellowship per year?	85
Table 12.	Responses by action and comparison group: Overall, were you satisfied with the training offered to you? (Areas covered)	87
Table 13.	Responses by action (only fellows): Satisfaction with partnerships developed as a result of your MSCA fellowship	89
Table 14.	Type of fellows have carried out research with during their fellowship, by action	89
Table 15.	Type of organisations fellows have created new collaborations with during their fellowship, by action	90
Table 16.	Share of fellows having concrete plans for future collaboration with researchers from MSCA network, by action	91
Table 17.	Bibliometric evidence on international and cross-sectoral collaboration of MSCA fellows and comparison group researchers.....	92
Table 18.	Responses by action (only fellows): To what extent do you currently collaborate with your former host institution?.....	92
Table 19.	Share of respondents changing sectors after MSCA fellowship/after leaving the sending organisation (RISE/IAPP/IRSES), by action	94
Table 20.	Responses by action (only fellows): To what extent was [move to other sector] the result of MSCA support? (share stating "to a (very) great extent").....	94
Table 21.	Responses by type of action and comparison group (only fellows): What is your current sector of employment?	95
Table 22.	Share of respondents changing fields of research after MSCA fellowship/after leaving the sending organisation (RISE/IAPP/IRSES), by action	96
Table 23.	Responses by action (only fellows): To what extent was [move to new field of research] the result of MSCA support? (share stating "to a (very) great extent").....	96
Table 24.	Researcher mobility at country and institution-level, MSCA fellows and comparison group	97

Table 25.	Interdisciplinarity of research output over the period 2007-2016, MSCA fellows versus comparison group and world average	98
Table 26.	Responses by action (only past fellows): What is your current employment contract?	98
Table 27.	Responses by action (only fellows): To what extent was the move to a permanent position after the MSCA fellowship the result of MSCA support?	99
Table 28.	Responses by action (only fellows): Do you believe that you would have attained the subsequent career stage after the end of your fellowship without participating in MSCA?	99
Table 29.	Responses by action (only fellows): To what extent was the move to a more senior position after the MSCA fellowship the result of MSCA support?	100
Table 30.	Quality of publications 2015, MSCA fellows versus comparison group and world average	102
Table 31.	Responses by action (only fellows): Did you produce the following outputs during your MSCA fellowship/as a result of your RISE/IAPP/IRSES staff exchange?	104
Table 32.	Responses by action (only organisations): To what extent has/will your participation in the MSCA programme led/lead to improvements in the following areas: Quality of training for researchers	107
Table 33.	Responses by action (only organisations): To what extent has/will formal or informal training in these areas been introduced/be introduced as a result of your organisation's participation in MSCA?	109
Table 34.	Responses ITN fellows versus comparison group of researchers: Overall, how would you rate the quality of scientific supervision during your time as a PhD candidate?	111
Table 35.	Comparison of satisfaction with training, ITN fellows and comparison group researchers (CG), (in%)	112
Table 36.	Exposure to workplaces outside of academia of ITN fellows and comparison group	113
Table 37.	Responses by action and comparison group (only researchers): At the institution where you did your fellowship/PhD, to what extent were procedures for recruitment open and transparent? (in%)	114
Table 38.	Responses by action: During your fellowship, were you offered career advice?	114
Table 39.	Responses by action and comparison group (only researchers): Estimated working time spent teaching during fellowship/PhD/post-doc	115
Table 40.	Responses by action and comparison group (only researchers): Estimated working time spent conducting research during fellowship/PhD/post-doc	116
Table 41.	Responses (only organisations): Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?	119
Table 42.	Type of organisations organisations have carried out research with during the MSCA project	119
Table 43.	Type of organisations organisations have created new collaborations with during MSCA project	120
Table 44.	Perceived impact of MSCA on various aspects of organisations' research capacity, by action (Share of organisations stating to a (very) large extent in%)	121

Table 45.	Responses by action (only organisations): Has your participation in MSCA produced commercial benefits for your organisation? Select all that apply.	122
Table 46.	Responses by action (only organisations): Number of jobs created as a result of MSCA project (excluding staff directly funded by MSCA), share of organisations in%	123
Table 47.	Impact of COFUND on increasing number of fellowships, by type of fellowship	125
Table 48.	Impact of COFUND on creating new or improving existing programmes, per type of COFUND (ESR, ER)	125
Table 49.	Impact of MSCA European Researchers' Night	127
Table 50.	Participation of various stakeholders in the European Researchers' Night event compared to previous /other events.....	130
Table 51.	MSCA's impact on retaining excellent researchers in Europe	132
Table 52.	Added value of EU funding, responses from organisation which were unsuccessful in their MSCA application	154
Table 53.	Nature of changes to projects that would have/have gone ahead without MSCA funding.....	155
Table 54.	Has participation in MSCA helped you to acquire additional research funds (choose all that apply)?	158
Table 55.	Participation patterns by country in FP7 and Horizon 2020	176
Table 56.	Participants and Participations by EU-28 Member State in Horizon 2020 MSCA – Widening countries in bold.....	177
Table 57.	Participants and Participations by Country group in Horizon 2020 MSCA	178
Table 58.	Participants and Participations by EU-28 Member State in FP7 MSCA – Widening countries in bold	179
Table 59.	Participants and Participations by Country group in FP7 MSCA	180
Table 60.	Overview of MSCA project – Hermes/Georg Forster Fellowships (COFUND)	185
Table 61.	Overview of MSCA project	193
Table 62.	Overview of MSCA project	201
Table 63.	Overview of MSCA project – BIO-ELECTRO-ETHYLENE (IF)	209
Table 64.	Overview of MSCA project – MUIMME (IF)	217
Table 65.	Overview of MSCA project – ANOCAP (IF)	224
Table 66.	Overview of MSCA project	228
Table 67.	Overview of MSCA project – MICACT (ITN)	233
Table 68.	Overview of MSCA project – Minilubes (ITN)	242
Table 69.	Overview of MSCA project	248
Table 70.	Overview of MSCA project – GLYCANC (RISE)	255
Table 71.	Overview of MSCA project – NANOREMOVAS (RISE)	264
Table 72.	Share of fellows surveyed who indicate to have acquired skill to a large or very large extent (in%), by action	302
Table 73.	Responses by action: Shares of respondents who would have liked more training in a certain area (in%), sorted by share total share.....	303
Table 74.	Responses by action (only fellows): What is your current employment status?	304
Table 75.	Share of organisations providing formal/informal training (%), by action, sorted by total share	305

Table 76.	Responses by action: Share of organisations providing training in a specific area which provide it exclusively to MSCA fellows	306
Table 77.	Agreement of ITN fellows and comparison group of researchers to the statement "My supervisor(s) were leading experts in my area of work".	307
Table 78.	Agreement of ITN fellows and comparison group of researchers to the statement "My supervisor(s) were sufficiently experienced in doctoral supervision"	307
Table 79.	Agreement of ITN fellows and comparison group of researchers to the statement "My thesis supervisor(s) met with me as much as I needed"	308
Table 80.	Responses by action (only organisations): Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?.....	308
Table 81.	Share of organisations having concrete plans for future collaboration with organisations from MSCA network	309
Table 82.	Responses by action (only organisations): Did your MSCA/RISE/IAPP/IRSES proposal include plans for any of the following outputs (choose all that apply)? & Have you produced these outputs as a result of the MSCA/RISE/IAPP/IRSES project?.....	310
Table 83.	Fellows' likelihood of having followed a research career in the absence of MSCA, by action	311

Table of figures

Figure ES1 The main Marie Skłodowska-Curie Actions (Horizon 2020)	15
Figure 1. Marie Curie Actions (FP7) and Marie Skłodowska-Curie Actions (Horizon 2020)	32
Figure 2. Intervention logic of the Marie Curie Actions (FP7)	38
Figure 3. Intervention logic of the MSCA (H2020)	39
Figure 4. Top 15 countries participating in MSCA projects in FP7 and H2020, out of all participations	45
Figure 5. MSCA budget and projects by panel	46
Figure 6. MSCA participation, factored by Gross Domestic Expenditure on Research and Development (GERD)	47
Figure 7. MSCA participation, factored by FTE researchers	47
Figure 8. Fellows and staff exchanges hosted, FP7 and Horizon 2020, top 20 countries	48
Figure 9. Nationality of fellows compared with countries of host institutions, MSCA H2020.....	49
Figure 10. Fellows with the same nationality as the host country in Horizon 2020 MSCA 50	
Figure 11. Impact of scientific authors, by mobility profile	55
Figure 12. Doctorate holders^ in the working age population (2012) –per thousand population aged 25-64	60
Figure 13. Importance of research and complementary skills for participation in MSCA 62	
Figure 14. Importance of different types of mobility for participation in MSCA.....	63
Figure 15. Management cost percentage for all programmes managed by REA and MSCA.....	67
Figure 16. Proportion of Commitments To Be Settled	67
Figure 17. MSCA and overall REA administrative expenditure by category	68
Figure 18. Outturn to payment appropriations – programmes managed by the REA..	69
Figure 19. Use and satisfaction with National Contact Point for support or guidance during the application phase	69
Figure 20. Average time to grant by year of call deadline, FP7 to Horizon 2020, MSCA and other activities managed by REA.....	70
Figure 21. Average time to grant in MSCA by action, FP7 and Horizon 2020 to date, by call year	71
Figure 22. Time-to-payment of interim/final payments, FP7 MSCA projects in 2014 and 2016.....	72
Figure 23. Individual support and guidance received from the Research Executive Agency.....	73
Figure 24. Effectiveness and appropriateness of administrative and financial rules (views of funded organisations)	74

Figure 25. Satisfaction of funded organisations with administrative mechanisms and reporting procedures.....	75
Figure 26. Based on your experience with the MSCA application process, please indicate your level of satisfaction with the following aspects of the administrative mechanisms and reporting procedures of the MSCA programme.....	75
Figure 27. Evaluation outcome of MSCA proposals in Horizon 2020, by type of action.....	77
Figure 28. Evaluation outcome of MSCA proposals in Horizon 2020, by scientific panel .	77
Figure 29. MSCA offers funding rates that meet the financial needs of funded projects .	80
Figure 30. How would you rate your overall satisfaction with the funding arrangements under the MSCA programme?	80
Figure 31. Projects cancelled, terminated or negotiation failed in FP7 and Horizon 2020	81
Figure 32. Proportion of cancelled/terminated projects, in FP7, by type of action	82
Figure 33. Share of fellows surveyed who indicate to have acquired skills to a large or very large extent (in%)	86
Figure 34. Shares of respondents who would have liked more training in a certain area (in%), sorted by share total share	88
Figure 35. Employment among fellows, by action: What is your current employment status? – share of fellows indicating to be employed or self-employed	93
Figure 36. Extent to which participation in MSCA has helped beneficiaries to acquire FP7/ H2020 funds.....	101
Figure 37. Share of organisations providing formal/informal training (%), sorted by total share.....	109
Figure 38. Network of top 5% organisations participating in ITN across FP7 and Horizon 2020	118
Figure 39. Share of open access articles out of all peer-reviewed articles published, by Horizon 2020 programme	136
Figure 40. Extent to which participation in MSCA has been a continuation of previous funding or has helped beneficiaries to acquire additional funds (national, regional or other) after the completion of the project.....	149
Figure 41. Nationality of fellows, FP7 and Horizon 2020, top 20 countries	181
Figure 42. Participants at the 2015 Night events (France), by level of education	293
Figure 43. Responses by skill acquired to a (very) large extent during fellowship (only fellows): Type of training	303

Acronyms

EID	European Industrial Doctorates
EJD	European Joint Doctorates
ERA	European Research Area
ESR	Early Stage Researchers
ETN	European Training Networks
FP7	Seventh Research Framework Programme
GERD	Gross Domestic Expenditure on Research and Development
H2020	Horizon 2020
HES	Higher Education
IAPP	Industry Academia Partnerships and Pathways
IDT	Innovative Doctoral Training
IF	Individual Fellow
IPR	Intellectual Property Rights
ITN	Initial Training Networks
MCA	Marie Curie Actions
MSCA	Marie Skłodowska-Curie Actions
NCP	National Contact Points
OECD	Organisation for Economic Cooperation and Development
P&G	Procter and Gamble
PPMI	Public Policy and Management Institute
PRC	Private Sector
PUB	Public Institutions
R&D	Research and Development
R&I	Research and Innovation
REC	Research Organisation
RISE	Research and Innovation Staff Exchange
SME	Small and medium-sized enterprises
SO	Specific Objective
STEAM	STEM plus Arts
STEM	Science, Technology, Engineering and Maths

Abstract

This document presents the findings of the FP7 ex-post evaluation and the Horizon 2020 interim evaluation of the Marie Skłodowska-Curie Actions. The Marie Skłodowska-Curie actions ensure excellent and innovative research training as well as attractive career and knowledge-exchange opportunities through cross-border and cross-sector mobility of researchers, to better prepare them for current and future societal challenges. Data for the evaluation were gathered through an in-depth literature review, analysis of programme data, online surveys with funded researchers and comparison groups (circa 19 500 responses were gathered in total), 60 telephone interviews with stakeholders, 18 case studies of individual MSCA projects, a bibliometric analysis of MSCA fellows and a comparison group, and a social network analysis of organisations that have participated in the programme. The results show that the programme is performing strongly in respect of all the evaluation criteria examined (relevance, efficiency, effectiveness, coherence and EU added value). Recommendations for further development of the programme are provided.

Executive summary

This report presents the main conclusions and recommendations from the ex-post evaluation of Marie Skłodowska-Curie Actions (MSCA) under FP7 and the interim assessment under Horizon 2020 (H2020).

In accordance with the Commission's Better Regulation Guidelines, the evaluation focused on five evaluation criteria: relevance, efficiency, effectiveness, coherence, and EU added value.

ES1 Overview of the Marie Skłodowska-Curie Actions

Article 179 of the Treaty on the Functioning of the European Union foresees a European Research Area (ERA) in which researchers, scientific knowledge and technology circulate freely. In this regard, the MSCA as a flagship programme for researcher mobility and training are embedded in the EU legal basis. The MSCA ensure excellent and innovative research training as well as attractive career and knowledge-exchange opportunities through cross-border and cross-sector mobility of researchers, to better prepare them for current and future societal challenges.

2017 marked the twentieth year of MSCA and the funding of the 100 000th fellow.

ES1.1 Programme design and objectives

Figure ES1 illustrates the types of actions through which the programme is implemented.

Figure ES1 The main Marie Skłodowska-Curie Actions (Horizon 2020)

<p>ITN Innovative Training Networks</p> <p>What does it offer? High-quality research training delivered through interdisciplinary networks, industrial doctorates or joint doctorates.</p> <p>Who applies? International networks of research organisations from the academic and non-academic sectors</p> <p>Who is funded? Researchers at doctoral level (less than 4 years of full-time research experience and no doctoral degree)</p>	<p>IF Individual Fellowships</p> <p>What does it offer? Opportunities to work on personal research projects by moving between countries and possible sectors to acquire new skills.</p> <p>Who applies? Individual researchers together with the host organisations</p> <p>Who is funded? Postdoctoral researchers</p>	<p>RISE Research & Innovation Staff Exchange</p> <p>What does it offer? The exchanges of staff members involved in research and innovation to develop sustainable collaborative projects and the transfer of knowledge.</p> <p>Who applies? International networks of research organisations from the academic and non-academic sectors</p> <p>Who is funded? Researchers, technical administrative and managerial staff of any nationality and at all career levels</p>	<p>COFUND Co-Funding of Regional, National & International Programmes</p> <p>What does it offer? Regional national or international programmes to foster excellence in training mobility and career development of researchers</p> <p>Who applies? Organisations funding or managing doctoral or fellowships programmes</p> <p>Who is funded? Researchers at doctoral and postdoctoral level</p>
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Source: European Commission

Beyond the overarching objectives of Horizon 2020, and while also contributing to a number of issues which are cross-cutting throughout the Horizon 2020 programme, MSCA addresses four specific objectives:

- Specific Objective 1 (SO1) – “Fostering new skills by means of excellent initial training of researchers” This specific objective aims at training a new generation of creative and innovative researchers, and enabling them to convert knowledge and ideas into products and services for economic and social benefit across Europe. It is mainly implemented through the Innovative Training Networks (ITNs).
- SO2 – “Nurturing excellence by means of cross-border and cross-sector mobility” This specific objectives aims to enhance the creative and innovative potential of researchers at all career levels by creating opportunities for cross-border and cross-sector mobility. It is mainly implemented mainly through Individual Fellowships (Ifs).
- SO3 – “Stimulating innovation by means of cross-fertilisation of knowledge” This specific objective aims to reinforce international cross-border and cross-sector collaboration in research and innovation by means of exchanges of research and innovation personnel. It is mainly implemented through Research & Innovation Staff Exchanges (RISE).
- SO4 – “Increasing structural impact by co-funding activities” This specific objective aims to increase the numerical and structural impact of MSCA and to foster excellence at national level in researchers' training, mobility and career development by leveraging additional funds and co-funding activities at the international, national or regional level, and is implemented through COFUND actions.

In addition to these four specific objectives, the programme also aims to raise awareness of the attractiveness of research careers, and disseminating research and innovation results emerging from MSCA projects. This is addressed largely through the annual European Researchers' Night.

There is a high degree of continuity between MSCA's objectives under Horizon 2020 and the preceding FP7.¹ However, the objectives and structure of MSCA have evolved over time to reflect emerging needs by:²

- Giving greater prominence to inter-sectoral mobility and addressing societal needs;
- Giving greater prominence to societal and innovation impacts, as is the case across the Horizon 2020 framework programme;
- Addressing emerging cross-cutting issues in research and innovation, such as Open Science, or Responsible Research and Innovation, and
- Giving stronger emphasis to the implementation and adoption of the Charter & Code for Researchers as well as the Principles for Innovative Doctoral Training (IDT)³.

ES1.2 Programme activities and funding

Overall, the programme saw a large increase in demand from FP7 to Horizon 2020, which was only partially met by an increase in programme budget.

¹ COUNCIL DECISION of 19 December 2006 concerning the specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013) (2006/973/EC). Available: <http://eur-lex.europa.eu/eli/dec/2006/973/oj>

² PPMI (2013) FP7 Marie Curie Actions Interim evaluation. Implementing Framework contract EAC/50/2009. Final Report.

³ As evidenced by the introduction of the Industrial Doctorates scheme and the revised setup of COFUND, which under H2020 co-funds doctoral training and focuses on the adoption of the IDT principles.

During FP7, MSCA funded over 11 000 projects involving 50 000 researchers with a budget of EUR4.8 billion. Under Horizon 2020, the MSCA are part of the Excellent Science pillar and has a budget of EUR6.2 billion to involve 65 000 researchers. This represents a 30% increase compared to FP7 and is a clear sign of recognition from stakeholders – including the Member States and the European Parliament – of the strong European added value of the programme and its proven track record over the past twenty years.

At the time of the evaluation, EUR EUR2 billion had been allocated to MSCA projects through the various calls under the first three years of Horizon 2020.

Brain circulation is a characteristic of the programme, where both movements towards more established countries are visible, as well as a certain trend of fellows returning to their country of nationality. EU Member States performing strongly in science and innovation, such as the UK, Germany and France, host the largest share of fellows. On the other hand, particularly Greece, Cyprus, Spain, Italy and Hungary have seen large proportions of fellows 'returning' to their country of nationality under MSCA in Horizon 2020 so far.

ES2 Method of approach and sources of evidence used

The evaluation covered the MSCA under FP7 (2007-2013) and under Horizon 2020 for the period 2014-2016. A mixed method approach was used to answer evaluation questions listed in Annex 2. The method consisted of the following elements:

- An in-depth literature review (including previous evaluations and MSCA related studies) to provide context for the evaluation;
- A review and analysis of programme data⁴, including programme activities up to 1st January 2017;
- Four online surveys of funded researchers and a comparison group of researchers, as well as funded organisations and a comparison group of organisations that applied for MSCA funding but were unsuccessful⁵ (circa 19,500 respondents in total: 8 500 organisations and 11 000 individual researchers);
- 60 telephone interviews with EU stakeholders, national policymakers, researcher representatives and experts on human resources in research;
- 18 case studies of individual MSCA projects, presenting a purposive selection of different types of actions across FP7 and Horizon 2020;
- Bibliometric analysis of MSCA supported researchers (MSCA fellows) and a comparison group of established researchers;
- A social network analysis of the MSCA programme throughout FP7 and Horizon 2020 up to June 2016.

Whilst the approach chosen was robust and introduced new elements compared to previous evaluations, limitations to the data available were also evident. In particular, improving availability and quality of data on individual level participants (i.e. fellows) as well as applicants would help to add value in future evaluations of the programme.

ES3 Conclusions and recommendations

This section presents the evaluation conclusions and recommendations with regards to the five evaluation criteria relevance, efficiency, effectiveness, coherence, and EU added value.

⁴ In most cases, FP7 and H2020 data are presented separately but, where appropriate, data for the years covering FP7 and H2020 may have been combined.

⁵ Organisations included universities, research institutions, business and other socio-economic actors, such as civil society organisations.

Overall the study concluded that the programme is very attractive and relevant for its intended target groups, and there are high levels of demand across the different types of actions supported. On the whole, the evidence collected suggests that the programme is structured coherently, and run effectively and efficiently. One important issue is the large oversubscription evident in application numbers. The programme furthermore offers strong EU added value. Accordingly, the evaluation puts forward a number of recommendations to improve the programme but does not propose any radical changes.

As regards the quality and availability of data discussed below, the study teams suggests to reflect on how this can be improved.

→Recommendation 1: The European Commission should aim to improve availability and quality of data on fellows, in particular collecting more meaningful information on fellow mobility, possibly through the new European initiative to track graduates⁶, and improving data quality/availability on researchers who applied for MSCA fellowships but were not funded.

ES3.1 Relevance⁷

MSCA is a highly relevant programme: the objectives of MSCA – to invest in people to produce internationally leading (excellent) research and innovation – remain central in the current context. They are expected to contribute to the achievement of growth and competitiveness, and to the solution of complex problems. As the European Commission recently noted: “highly-trained researchers are necessary to advance science and business competitiveness, which, in turn, are important factors in attracting and sustaining investment in Europe”.⁸

The bottom-up approach of the programme provides the space for researchers to come up with their own solutions to major societal and research challenges, and stakeholders agreed that this bottom-up approach should continue.

Equality and diversity are important elements in the programme. To date, 40% of MSCA-supported researchers are women (37% in FP7) – this is higher than the average percentage of female researchers in Europe. Around 41% of MSCA grants funded in Horizon 2020 until January 2017 take into account the gender dimension, higher than the 25% of all grants funded in that period across Horizon 2020. The proportion of women participating in each individual MSCA scheme has generally increased between FP7 and Horizon 2020. MSCA grants under Horizon 2020 so far have also seen a larger share of female coordinators (47%), when compared to the Framework Programme (33%). However, there is a smaller representation of women as supervisors in Individual Fellowships (21%), which reflects the glass ceiling apparent among academic staff and research boards.

→Recommendation 2: While the programme performs well in relation to gender equality, it is recommended that the Career Re-start Panel be enhanced – for example in terms of its duration – to further stimulate this aspect. It is also recommended that additional support be provided to people with disabilities, in order to facilitate their participation in the programme.

⁶ European Commission (2017) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a renewed EU agenda for higher education. SWD (2017) 164 final. p.5.

⁷ Relevance refers to the extent to which an intervention (still) matches the (current) needs and problems.

⁸ European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. p.133. 29-05-2017.

The programme does not currently include an objective related to widening participation. EU-13 countries tend to submit fewer proposals than EU-15 countries and the quality of EU-13 countries' proposals is, on average, also lower than those of EU-15 countries. In 2016 the Council invited "the Commission and Member States to foster and adequately reward all types of mobility, including virtual mobility, while taking into account the need to close the research and innovation divide across Member States and regions"⁹. The Commission is already actively working towards closing the research and innovation divide. In its recent Communication on a renewed EU Agenda for higher education the Commission included a commitment to "Develop opportunities within the Marie Skłodowska-Curie actions that help close the research and innovation divide between Member States and regions and help address brain drain from less developed regions".¹⁰

→Recommendation 3: In this context, and given that the programme aims to support excellence and competitiveness across Europe, the inclusion of an objective and associated actions in MSCA to address this divide deserves consideration.

The four specific objectives of MSCA are highly relevant, as they are focused on the development of excellent researchers (and in particular the next generation of researchers), mobility and cross-fertilisation across sectors in order to make Europe's science system more attractive and further extend its contribution to innovation and growth. More specifically, the following aspects can be noted:

SO.1 Fostering new skills by means of excellent initial training of researchers

MSCA has a key role in "building competence in the long term, focusing strongly on the next generation of science, systems and researchers, and providing support for emerging talent"¹¹ to consolidate the ERA and make the Union's science system more competitive and attractive globally. The stimulation of excellent and innovative research training and mobility opportunities (geographical, sectoral, disciplinary – see below for further details) are tools that the MSCA uses to better prepare researchers to address current and future challenges. The majority of current EU doctoral candidates will not take up an academic career, and the need to develop the skills that they require to be employed in non-academic sectors has become a major concern. There is a need to broaden their skill base and provide them with interdisciplinary and transferable skills. MSCA aims to achieve this objective primarily through its ITNs and the doctoral programmes in COFUND – see also section ES3.3 on Effectiveness below.

The need to make Europe's science system more competitive remains. For example, the US has a larger proportion of high-impact publications than the EU, while producing fewer scientific publications. This suggests that the US is more efficient at producing the very best scientific outputs. Emerging countries, such as China, are increasingly producing cutting-edge research. This underlines the importance of actions, such as MSCA, to further develop the skills and training of current and future generations of European researchers.

→Recommendation 4: MSCA should continue to place strong emphasis on the development of skills of researchers, in particular of the next generation of

⁹ Council of the European Union (2016) Measures to support early stage researchers, raise the attractiveness of scientific careers and foster investment in human potential in research and development. 14301/16. Brussels, 18 November 2016. P.6.

¹⁰ European Commission (2017) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a renewed EU agenda for higher education. SWD (2017) 164 final. p.9.

¹¹ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020.

researchers. This training should continue to be tailored to the diversity of career pathways that doctoral candidates are likely to pursue.

SO.2 Nurturing excellence by means of cross-border and cross-sector mobility

Geographical mobility produces significant benefits for researchers. In Europe, researchers with international experience tend to exhibit a higher scientific impact. Mobility is also a key tool to develop international cooperation, which strengthens the EU's research excellence and attractiveness by providing access to new resources, and can provide access to research test beds and advancements in innovation in areas where European countries are less specialised. This suggests that actions to stimulate mobility continue to be needed.

Almost 140 nationalities have received MSCA funding since 2014. Around one in four MSCA fellows are researchers attracted to Europe from countries outside the EU Member States or the Horizon 2020 Associated Countries. There are imbalances in the mobility of European researchers, with low levels of mobility towards emerging countries such as Brazil, China and India. However, MSCA does seem to be attractive for non-EU researchers and organisations from outside the EU: participations in MSCA account for around 80% of all US participations across Horizon 2020 while for the other top four countries in terms of participation (China, Australia, Canada and Brazil) the share is so far around 50% or higher.

→Recommendation 5: MSCA is a relevant instrument to stimulate mobility to emerging countries. Given the strategic importance of these countries, this could be enhanced further. In this respect, it is recommended that the European Commission considers ways in which Global Fellowships could make mobility towards emerging destinations more attractive, without compromising the programme's emphasis on excellence. This could entail, for example, providing additional information about leading centres in those countries to potential MSCA applicants, or other forms of awareness raising. Participation of emerging destinations in RISE and ITN projects could also be further promoted, as this would enable European-based research staff, including PhD candidates, to spend short periods of up to one year in these countries.

MSCA's emphasis on cross-sectoral collaboration, for example through Industrial Doctorates, continues to be relevant and welcomed by stakeholders. Over the course of H2020, it is expected that 65 000 researchers experience international mobility funded by MSCA, and that "for just under half of them, this will also include mobility or exposure to the non-academic sector or vice-versa"¹². In 2016, a new pilot, the Society and Enterprise Panel for experienced researchers within the IF was launched. This reflects efforts to better meet the needs of the non-academic sector.

A recent Commission communication campaign addressed specifically at businesses has been associated with an increase in the number of applications from businesses in H2020, although "a number of businesses still lack information about certain specific aspects of the MSCA", including its relevance and potential benefits to them¹³.

→Recommendation 6: It is recommended that the Commission continues its efforts to promote MSCA to the private sector, in line with the recommendations from the recent study of business participation and entrepreneurship in MSCA.

¹² European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.176.

¹³ PPMI, AIT and Optimity (2017) Study of business participation and entrepreneurship in MSCA actions (FP7 and Horizon 2020). Final report to DG Education, Youth , Sports and Culture. P.120.

Interdisciplinary research is gaining relevance because complex societal challenges increasingly require collaboration between different disciplines for their solution. At the individual level, interdisciplinary knowledge is seen to enhance employability. The proportion of all researchers in the EU working in the private sector (48% in 2014) is significantly below the levels of US, Japan, Korea, Canada or China. Collaboration between sectors in terms of public-private co-publications is also comparatively low in Europe. The main barriers to cross-sectoral mobility include researchers' lack of the particular skills to cooperate with industry (see also SO.1).

Around 30% of MSCA-IF proposals are deemed to have included interdisciplinary research. This is a strong signal of the importance of interdisciplinarity within MSCA. The importance of interdisciplinarity does not feature as explicitly in the MSCA objectives as geographical and cross-sectoral mobility, although this does not proscribe the adoption of actions to the work programme in order to enhance interdisciplinarity.

→Recommendation 7: It is recommended that ways to further enhance interdisciplinary work within the MSCA are promoted. This may include increased flexibility of calls and researcher positions, such as combined positions or part-time work – not to limit the possibilities of entrepreneurial activity or formal training to enhance interdisciplinary knowledge – and secondments. Actions could also be adopted so that interdisciplinary researchers are assessed according to their profile: for example, recognising that interdisciplinary researchers may have profiles that differ from the standard track record of other excellent researchers.¹⁴

SO.3 Stimulating innovation by means of cross-fertilisation of knowledge

Europe lags behind main international competitors such as the US, Canada and Australia in terms of innovation. MSCA's emphasis on cross-fertilisation and sharing of knowledge from research to market (and vice-versa) is pursued through the mobility of highly skilled research and innovation staff. Commercial and innovation outcomes were given a more prominent role in H2020 compared to FP7, to more decisively address this objective.

RISE provides a critical mass, with almost 23 000 planned secondments with staff exchanges to or from non-academia and to or from third countries in the first three years of H2020. A number of stakeholders (policy-makers) view the RISE action as being related primarily to the building of long-term relationships, rather than excellent science.

SO.4 Increasing structural impact by co-funding activities

There is a clear rationale for the establishment of mechanisms that enable European stakeholders to pool resources and combat fragmentation in terms of objectives and actions. There is also a clear rationale to spread the best practices generated by MSCA as aimed by the MSCA COFUND scheme. COFUND aims to achieve a "structural impact" as the leverage of additional resources leads to increases in the number of available mobility opportunities (geographical, sectoral, interdisciplinary) across Europe. COFUND also aims to help to reshape existing mobility schemes and spread the adoption of innovative training and the improvement of employment conditions for researchers, which as discussed previously, are highly relevant in the current context.

Raising awareness of research careers

MSCA aims to raise awareness of researchers' work amongst the general public (in particular young people), and help change public perception of science, in order to

¹⁴ See also European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.148.

enhance the recognition of research and innovation activities and the attractiveness of research careers. While all MSCA projects include dissemination activities, the European Researchers' Night through its funded projects around Europe and beyond specifically addresses these aims of the programme. The majority of European countries have a lower share of doctorate holders (compared to their population) than international competitors such as the US, Australia or Canada, and there is a significant lack of awareness and understanding of researchers' work and its importance for the EU.

ES3.2 Efficiency¹⁵

The implementation of the programme is appropriate and efficient.

There is consensus among stakeholders that the budget is insufficient, reflected by high oversubscription leading to low success rates, particularly affecting ITNs. Indeed, the programme's oversubscription rate has doubled between FP7 and Horizon 2020. This continued oversubscription reduces the overall programme impact, and provides clear indication that the programme impact could be larger if more EU budget were to be made available. The oversubscription rate is highest for ITN, with ten times more high quality proposals not funded compared to proposals funded, under H2020. IF received around five times as many high quality proposals than it could fund, and RISE around two times as many. The insufficient programme budget could result in a loss of talent with wider implications on research and innovation capacity across the EU.

→Recommendation 8: It is recommended that the European Commission considers increasing the programme budget in order to reduce current oversubscription rates (ITN are in particular need of a budget increase).¹⁶

A further option to reduce oversubscription, at least for single beneficiary actions, would be to limit the ability for resubmission similar to restrictions imposed by the European Research Council. For instance, coordinators of proposals below a certain threshold (but above the quality threshold) could be asked to resubmit but with a delay of one year. There are however numerous issues that would need to be examined with respect to the practical aspects of such restrictions, e.g. would the individual researcher funded and/or the coordinator be prevented from re-applying?

→Recommendation 9: It is recommended that the European Commission studies the implications of adding resubmission restrictions.

The administrative budget committed by REA to MSCA in H2020 constitutes only a small proportion of the operational MSCA budget, averaging 2.5% between 2009 and 2015, and therefore consistently below the legal objective of maximum 5%. In addition, the proportion of the MSCA budget devoted to management is also consistently lower than the maximum 5%. The use of unit costs in MSCA means that the programme has a very low risk of errors in financial management, contributing further to the efficiency of programme management.

→Recommendation 10: While the relative management costs of MSCA remained consistently below the legal maximum of 5% between 2013 and 2016, it is recommended that the European Commission continues to efficiently monitor these costs.

¹⁵ Efficiency considers the relationship between the resources used by an intervention and the changes that intervention has generated.

¹⁶ Alleviating the oversubscription of ITN would be most costly, but given the strong EU added value of the ITN such change would have the largest potential for delivering additional programme results.

REA's operational commitment and payment appropriations for the (non-differentiated) administrative appropriations were almost completely fulfilled between 2011-15. The evaluation process is well designed and managed. The average time-to-grant for MSCA projects decreased significantly between 2009 and 2015. Monitoring indicators are fit for purpose. REA's overall processing and completion of payments also improved between 2012 and 2015.

Furthermore, survey respondents were generally satisfied with the level of funding received. In line with the interim review of MSCA unit costs conducted by ICF¹⁷, there is strong evidence that the programme offers adequate and attractive levels of funding.

The European Researchers' Night, with an annual budget of EUR 4 million, can be considered cost-effective as it manages to reach out to more than one million citizens every year, right across the EU, in particular informing young people about a possible career in research.

ES3.3 Effectiveness¹⁸

Drawing on analysis and data over several years¹⁹, a large body of evidence shows that MSCA continue to have a positive impact on individual researchers, organisations, and at the system level. It should be noted however that no MSCA projects under Horizon 2020 had been completed at the time of writing. It is thus clear that the measurable output at this stage of the Horizon 2020 programme implementation is somewhat limited. Moreover, as the full value and impact of mobility and opportunities opened up by MSCA is often revealed after many years, the results of some FP7 projects have been used where appropriate.

ES3.3.1 Individual level

ES3.3.1.1 Training and skills development

MSCA's training and professional development dimension is strong: Over three quarters of participants are (very) satisfied with the training and professional development opportunities they received during their MSCA fellowship. The training is effective in equipping fellows with both skills specific to the research profession and transferable skills. ITN stands out in terms of the volume of training followed by fellows (30% of ITN fellows who responded to the survey had followed more than 20 days of training per year) and fellows' satisfaction with the training areas covered (66% of ITN survey respondents were (very) satisfied), indicating that the strong intended focus of ITN on intensive initial training for Early Stage Researchers (ESR) is indeed put into practice. Almost 60% of MSCA fellows who responded to the evaluation survey indicated that there were areas in which they would have liked more training such as in the area of report and proposal writing, new and/or advanced scientific methods, and team management and leadership skills.

➔Recommendation 11: It is recommended that the European Commission continues to stimulate the availability of relevant training as part of the programme. This could include the development of online-training modules to enhance equal access of MSCA fellows to high quality training opportunities in areas of specific relevance to the MSCA

¹⁷ ICF (2017). Mid-term review of MSCA unit costs.

<https://publications.europa.eu/en/publication-detail/-/publication/0f44192e-5499-11e7-a5ca-01aa75ed71a1/language-en/format-PDF/source-31288412>

¹⁸ Effectiveness analyses the progress made towards achieving the objectives of the intervention – exploring whether or how the changes were linked to the intervention. Effectiveness analyses the progress made towards achieving the objectives of the intervention.

¹⁹ This includes projects financed under FP7 and H2020. It also draws largely on surveys of MSCA fellows and organisations carried out for this evaluation in 2016.

programme (e.g. setting up modules in interdisciplinary research, entrepreneurship, open science). At the same time, it is important to ensure the right balance between the training and secondments as part of ITN projects with the need to produce high quality research and complete the thesis in the timeframe foreseen.

ES3.3.1.2 International mobility and collaboration

MSCA fellows are much more internationally mobile than other researchers throughout their careers, in particular IF fellows. Evaluation findings suggest that over the past 10 years, one third of IF fellows have changed their country of employment at least twice, compared to 1 out of 10 researchers in the comparison group. More than half of the publications of IF fellows between 2007 and 2016 were publications involving international collaboration. This was 15 percentage points above the comparison group of researchers similar to IF.

Some 80% of fellows created collaborations with researchers abroad (i.e. in countries other than the country of the fellowship) during MSCA fellowships, and these collaborations tend to be sustained.

Data show that MSCA is open to the world with around one in four MSCA fellows attracted to Europe from countries outside the EU Member States or the Horizon 2020 Associated Countries. In terms of international third-country participation, MSCA plays a strong role in ensuring the international orientation of Horizon 2020. So far, MSCA accounts for around 50% of all third country participation in Horizon 2020. Moreover, RISE is the most international scheme across Horizon 2020, with around 32% of its total participations coming from third countries. IF(11%) and COFUND (7%) also exhibit international participation levels above the Horizon 2020 average.

ES3.3.1.3 Cross-sectoral mobility and collaboration

MSCA contributes to cross-sectoral mobility of researchers during and after the MSCA projects. Over the first three years of RISE 2014-16, there were 6 510 planned secondments from academia to non-academia and 4 302 from non-academia to academia. Moreover, around 12 000 of the approximately 27 000 fellows that have been funded under the budget of the MSCA calls for the years 2014-16 are estimated to experience some form of cross-sectoral mobility out of or into an academic setting. In addition, the survey of MSCA fellows shows that 11% of MSCA fellows mainly hosted in the academic sector during their fellowship moved to the non-academic sector after the end of the fellowship (RISE/IAPP: after terminating employment with the sending organisation). 38% of these attribute this move to a (very) large extent to MSCA participation. Cross-sectoral mobility after the end of the fellowship is particularly high under ITN (19% of fellows moved to the non-academic sector) and RISE (28% of those who leave their sending organisations move to the non-academic sector). With regard to cross-sectoral collaboration in research, ITN fellows perform strongly: their share of academic-corporate cross-sector publications (4.3%) is significantly higher than the world average (2.6%) and also higher than the cross-sector publication shares of the comparison group of researchers similar to ITN (3.8%).

ES3.3.1.4 Interdisciplinary mobility

The MSCA programme is effective in stimulating cross-fertilisation of knowledge across fields: one in four MSCA fellows moves to a new field of research as part of their first employment after their fellowship, and more than half of them believe that this is to a (very) great extent the result of participating in MSCA. The share of fellows who move to a new field of research after the end of their fellowship is particularly high in ITN (27%) and RISE (39% of those changing employers).

ES3.3.1.5 Employment/ careers/ excellence

There is strong evidence that the MSCA programme is effective in boosting the career of researchers. Around 60% of past MSCA fellows believe that it would have taken them more time to attain their subsequent career stage without the MSCA fellowship, and 12% believed they would not have attained the subsequent career stage at all.

There is also compelling evidence that MSCA helps produce the next generation of leading researchers: overall, MSCA fellows are twice as likely as the average researcher to have publications that belong to the Top 1%, Top 5% and Top 10% of cited publications. IF fellows perform up to three times better than the average researcher with regard to Top 1% cited publications and out-performed the comparison group of successful, established, high profile researchers constructed for this evaluation on important indicators of excellence (i.e. Top 5% and Top 10% cited publication share of total output).

Among former IF fellows, 95% reported that they were in employment at the time of the survey (end 2016).

The evidence shows MSCA had helped create new jobs in addition to staff directly funded by the project. In total, 23% of organisations had created (or will create) one additional full time equivalent job while 12% of organisations had created two or more FTE posts as a result of participation in MSCA.

ES3.3.2 Organisational level

At organisational level, MSCA has a larger impact on the quality of training than on the breadth of training offered. The quality of the training available to researchers in the organisation is often enhanced by the knowledge and skills brought to the organisation by the fellows, in particular for IF. ITN organisations are successful in providing fellows with exposure to industry (52% of ITN fellows versus 29% of comparison group researchers).

Evidence shows that organisations participating in MSCA are more often complying with the Charter and Code with regard to the openness and transparency of recruitment procedures. Around 55% of MSCA fellows perceive the recruitment procedures at the institution where they did their fellowship to be open and transparent to a (very) great extent, compared to 43% of researchers in the comparison group.

Organisations participating in the ITNs tend to implement the Principles of Innovative Doctoral Training. 72% of ITN fellows rate the quality of supervision they receive/have received as (very) good (15% report it to be fair). A similar percentage is (very) satisfied with the quality, amount and coverage of training received, more so than researchers in the comparison group. ITN fellows also tend to have more exposure to industry work places during their doctoral studies than researchers in the comparison group. New collaborations resulting from MSCA projects are more often international than national (84% versus 45% for new collaborations with (other) academic organisations, and 53% versus 30% for (other) non-academic organisations).

With regard to organisations' research capacity, MSCA's impact is greatest on the internationalisation and interdisciplinarity of organisations, and their capacity to bid for other research funds.

Organisations are highly effective in delivering the publications (90% of the organisations in the evaluation survey reported to have achieved their publication objectives) and prototype development and demonstrations and new improved technical codes and standards (80% of organisations) proposed as part of their MSCA project application. The share of organisations that achieved patent/trademark

applications, new or improved products, services or clinical trials as initially planned is lower (45%, 47% and 57% respectively).

→Recommendation 12: The European Commission should investigate in more detail why only about half of organisations which planned patent/trademark applications, new or improved products, services or clinical trials reported to have achieved these plans, i.e. whether this is due to a time lag between the end of the MSCA project and achieving this output, whether project proposals were too ambitious or whether this is due to the risk of failure implied in research.

ES3.3.3 System level

Around 45% of ITN fellows (40% of MSCA fellows overall) reported that they were not very likely to have pursued a research career in the absence of MSCA funding. There is thus a role for MSCA as a contributing factor in the attraction into / retention in research careers of a substantial proportion of participants. Moreover, more than one quarter of organisations report that the MSCA programme has helped them to retain excellent researchers who would have left Europe otherwise.

COFUND has a substantial effect on opportunities for researchers for cross-border mobility in a country, both through the creation of new programmes and the opening of existing programmes for transnational mobility. One third of COFUND organisations which responded to the survey report that participation in COFUND has increased the number of transnational fellowships to a (very) large extent. Fewer organisations report that participation in COFUND has increased the number of intersectoral or interdisciplinary fellowships to a (very) large extent (6%). A tangible structural impact of COFUND with regard to increasing the number of international, interdisciplinary and cross-sectoral fellowships can be expected in countries with several parallel-running COFUND projects. A structural impact on working conditions of fellows has been reported when national schemes are adjusted to fit the COFUND requirements in view of applying for COFUND.

The creation of a genuine open labour market for researchers is one of the priorities of the European Research Area (ERA). In this regard, the MSCA continue to have a pronounced structuring impact on ERA and institutional practices by contributing to the systematic implementation of the European Charter and Code of Conduct for the Recruitment of Researchers and in particular by setting standards for quality (doctoral) training, attractive employment conditions and open recruitment for all EU researchers. For example, all funded MSCA participants are required to apply the principles of the European Charter for Researchers and Code of Conduct, and this evaluation shows that indeed the majority of MSCA fellows (55%) perceive the recruitment procedures at the institution where they did their fellowship to be open and transparent to a (very) great extent.

MSCA is also contributing to the ERA by creating collaboration among academic organisations, and between academic and non-academic organisations, which this study shows are highly sustainable.

Furthermore, in particular, ITNs contribute to the wide promotion and implementation of the EU Principles for Innovative Doctoral Training which identify the need to provide young researchers with quality supervision, (transferable) skills training, sustainable professional networks, and exposure to industry and other employment sectors. Compliance with the IDT of organisations participating in ITN is confirmed by ITN fellows consulted as part of this evaluation study. Moreover, evidence from interviews suggest that in some countries ITNs have had an impact on national doctoral programmes as they set best practice examples which are followed by other organisations, also those not receiving EU funding.

ES3.3.4 Cross-cutting issues

MSCA performs well in relation to cross-cutting objectives such as gender balance, societal challenges, Responsible Research and Innovation (RRI) and open access.

The general openness of and bottom-up approach taken by MSCA has allowed a large majority of institutions to train and upgrade the skills of a new generation of researchers able to tackle a broad range of current or expected societal challenges. Moreover, MSCA funding addresses societal challenges to a significant extent, above the Horizon 2020 average and well ahead of the other areas in the excellence pillar.

MSCA has performed strongly in relation to gender equality, as discussed above. MSCA performs in line with Horizon 2020 in relation to other cross-cutting objectives, such as Responsible Research and Innovation (RRI) or open access. It is worth noting that ITN fellows had a significantly higher share of their articles published in 'gold' open access compared to their comparison group (42% compared to 33% between 2006 and 2016). This suggests that the programme is nurturing new cultures of publishing in the next generation of Europe's leading scientists.

There is a broad consensus among participating organisations that the European Researchers' Night projects contribute to establishing direct contacts between researchers and the public at large and that it increased the visibility and understanding of researchers' work.

European Researchers' Night projects attract more than one million citizens across Europe and have enabled the participating organisations to better involve various groups of stakeholders compared to previous or other events, in particular the young.

ES3.4 Coherence²⁰

MSCA is coherent with other H2020 actions. MSCA is particularly supportive of the international participation objectives of H2020. MSCA has helped beneficiaries to acquire additional FP7 and H2020 funds post-participation. This is suggestive of the complementarity between these policy instruments. The reduction of actions under H2020 has contributed to the clarity and coherence of its integrating parts. Some stakeholders reported a degree of overlap with the Horizon 2020 SME Innovation Associate Initiative (IAI), that funds the recruitment of doctorate holders in SMEs.

→Recommendation 13: Given the commonalities between both initiatives it is recommended that the Commission ensures coherence and complementarity between the actions, and considers the possible incorporation of IAI into MSCA.

The programme includes a coherent set of actions. A small number of stakeholders questioned the coherence of NIGHT with other actions. NIGHT was seen as less directly linked with the core concern of the programme around excellence than other actions. NIGHT aims to raise awareness and recognition of the public on research and innovation activities and research careers. Its coherence and synergies with other parts of the programme could be enhanced by modifying NIGHT's narrative in order to present NIGHT as a platform that aims to "showcase" excellent research to the general public.

→Recommendation 14: In order to enhance the coherence of the European Researchers' Night with other actions, NIGHT's narrative and activities could be modified to more clearly emphasise its role in showcasing excellent research – in particular, excellent research associated with MSCA – and connect it more strongly to other parts of MSCA. This showcasing of excellent research could include an explicit

²⁰ Coherence refers to how well an intervention works internally and with other interventions to achieve common objectives or as complementary actions.

European dimension, for example by linking MSCA projects (including completed projects) on selected topics through ICT. It is also recommended that the EU continue to exchange good practice among the national coordinators of the NIGHT.

MSCA exhibits a high degree of coherence with other EU policy initiatives including Europe2020, its flagship initiatives, the New Skills Agenda for Europe and the European Research Area (ERA). It is also coherent with ET2020 and recent legislative developments on the conditions of entry and residence in the EU for the purposes of research. MSCA is highly coherent with EU financial instruments such as Erasmus+, the European Structural and Investment Funds (ESIF). This coherence is manifested in the mutually reinforcing character of these interventions and MSCA –see also section on EU added value.

→Recommendation 15: Given the large degree of coherence with related EU policy initiatives, it would be appropriate to maintain the mobility, training and career development of researchers through MSCA within H2020 and future Framework Programmes for research.

→Recommendation 16: Synergies with the European Structural and Investment Funds (ESIF) through the COFUND action have materialised during the implementation of MSCA. Best practices in the use of such synergies, and more formal mechanisms to develop them, should be identified and promoted to increase their uptake.²¹

MSCA is complementary to the objectives of regional and national funding for the development of research excellence. National funding for doctoral training does not normally include mobility requirements. Those national funding schemes that include mobility requirements tend to have a lower degree of flexibility than MSCA with regard to the geographical scope of the hosting institution, and tend to support either young researchers or senior researchers, but rarely both types. Most often, they aim to attract highly experienced researchers. This contrasts with MSCA's emphasis on skills development. MSCA, additionally, offers a greater emphasis on inter-sectoral research than most national programmes. The complementarity between MSCA and national funds can be seen in that a high proportion of MSCA beneficiaries reported that MSCA had helped them to acquire non-MSCA related national and/or regional research funds.

Complementarity with national funding programmes has been enhanced through the introduction, in 2016, of a Seal of Excellence, which is awarded to IF proposals which score 85% or above but for which there is insufficient funding through the MSCA budget. The Seal of Excellence provides researchers who have achieved this score with recognition for the quality of their proposals; it can be used by these researchers and the hosting institutions with whom they applied to seek alternative funding sources – for example at regional and national level, including through the use of ESIF²².

Whilst MSCA in principle offers flexible funding arrangements, there is more that could be done to increase the flexibility of the programme. For example, the exclusivity requirement in RISE (exclusivity of work on the MSCA project during the secondment) means that sometimes long secondments under this action can be considered difficult/impractical by senior staff who would like to undertake them, but are deterred by the programme requirement not to work on other projects during the secondment period.²³

²¹ MSCA Advisory Group Report June 2016

²² European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.172.

²³ See http://ec.europa.eu/research/participants/portal/doc/call/h2020/msca-rise-2015/1647602-faqs_rise_2015_updated_en.pdf p.8.

The 36 month maximum period for ITN fellows does not match programme structures in some national contexts where doctoral studies are designed as 4-year programmes. In some cases this may deter participation due to difficulties to find funding for the 4th year of study and reduces the incentives of institutions to take part in ITNs. Given current levels of oversubscription in ITNs this does not seem to be a widespread problem, even though it may affect certain centres of excellence in specific locations where a 4th year is required. Funding a 4th year in those cases, however, would concentrate the budget further, reduce the number of projects and increase levels of oversubscription, unless a significant budgetary increase for the action be achieved. It should also be noted that a number of countries with 4 year structures have recently moved or are in discussions to move to a 3 year structure.

ES3.5 EU added value²⁴

Survey responses suggest that in Horizon 2020 so far, high-quality proposals equalling EU funding of around EUR9.5 billion did not go ahead in the absence of MSCA support.²⁵ The evaluation found that only 6% of unsuccessful proposals went ahead without significant changes, suggesting a remarkably low degree of deadweight.

The evaluation found EU added value of the programme across all three levels of intervention. At individual level, MSCA provides particular EU added value through its offer of structured training and career development for researchers during and after their PhD. Furthermore, both individual researchers and institutions build their networks, often facilitating long-term collaboration.

At project level, MSCA's EU added value is particularly strong in providing cross-border and cross sector mobility, which can be seen by the large amount of unsuccessful proposals which have to cut back their international and intersectoral activities in the absence of EU funding.

In addition, the international training and supervision offered within MSCA projects is considered to be of extremely high level and often adds value to training and supervision available under national schemes, according to stakeholders. MSCA is not only contributing to the quality of existing training, but also encourages the development of training tailored to the needs of MSCA fellows that would not be available otherwise.

Training offers that are reserved for MSCA fellows most often concern industry or market-related topics such as 'Marketing and sales' and 'Product development'. On the contrary, areas such as 'publishing' and 'research ethics' are usually not a specific added value of the MSCA programme. This suggests that, even if such exclusive tailored training is only reported by a minority of organisations, MSCA fellowships have a specific added value on training provided, widening their focus to topics less familiar to the academic environment.

Researchers are generally satisfied with the level of training offered, and organisations indicate that the quality of training has increased with participation in MSCA. Despite the high levels of overall satisfaction with the breadth of training offers, almost 60% of MSCA fellows who responded to the survey indicated that there were areas in which they would have liked more training such as proposal writing.

²⁴ EU added value refers to the value resulting from EU interventions that is additional to the value that would have resulted from interventions initiated at regional or national levels, by both public authorities and the private sector.

²⁵ As of January 2017, high quality proposals worth EUR13 billion were unsuccessful in winning funding under Horizon 2020. Using survey responses from unsuccessful applicants, 73% of unsuccessful proposals seem to not be implemented at all after failing to win EU funding, resulting in a loss of projects worth around EUR 9.5 billion so far.

Beneficiary organisations reported a strong effect on winning follow up funding. Looking only at projects that were not a continuation of previous research, around 51% of respondents stated that MSCA helped in obtaining extra resources.

At system level, the programme has provided EU added value through a structuring effect across Europe. MSCA contributes positively to ERA by helping to create a more effective EU research system, boosts transnational cooperation and competition and promotes an open labour market for researchers. More specifically,

- The programme serves as a delivery mechanism for the European Charter and the Code of Conduct for the Recruitment of Researchers, introducing standards and common rules that are increasingly adopted. All funded MSCA participants are required to apply the Charter and Code.
- It spreads good practice in researcher training and skill development at national level and contributes, in particular, to the promotion and implementation of standards for doctoral training through the stimulation of the use of the Principles for Innovative Doctoral Training (IDT). A further structuring effect of the programme is that it helps to introduce industry relevant training to institutional curricula.
- The MSCA bottom up approach has allowed participating organisations to upgrade their training offers and nurture a new generation of researchers.
- The MSCA has fostered international mobility and the formation of knowledge networks and collaboration across Europe.
- Finally, host institutions believe that the programme has helped to retain excellent researchers in Europe who would have otherwise left.

→Recommendation 17: It is recommended that the European Commission considers ways to encourage further added value in the training offered by host institutions beyond the structuring effect observed. Particular attention should be paid to areas where fellows indicated they would have liked more training.

1 Introduction

This is the final report for the ex-post evaluation of Marie Curie Actions under FP7 and the interim assessment of the Marie Skłodowska-Curie Actions of Horizon 2020 (H2020).

In accordance with the Commission's Better Regulation Guidelines²⁶, the present study has focused on five evaluation criteria: effectiveness, efficiency, relevance, coherence, and EU added value: the effectiveness of the programme in terms of achieving stated objectives; its efficiency in terms of use of resources; its continued societal relevance; the coherence within the programme and with other programmes and instruments, and the EU added value of the programme. Along these main evaluation themes, the remainder of this final report is structured as follows

- Section 1 provides an overview of the study objectives, the method of approach as well as a summative review of the programme rationale as well as its implementation to date.
- Section 2 discusses the relevance of the MSCA programme.
- Section 3 discusses the efficiency of programme implementation.
- Section 4 discusses the effectiveness of programme implementation.
- Section 5 discusses the internal and external coherence of MSCA.
- Section 6 discusses EU added value of the MSCA programme.
- Section 7 summarises conclusions and recommendations from the study research.

1.1 Marie Skłodowska-Curie actions

MSCA provide grants for all stages of researchers' careers and aim to encourage transnational, intersectoral and interdisciplinary mobility.²⁷ Since 2009, the programme is implemented by the Research Executive Agency (REA).²⁸ The European Commission and REA are supported in implementing the programme by a network of National Contact Points (NCP), which provide guidance, practical information and assistance on all aspects of applying for MSCA funding as well as participating in the programme.

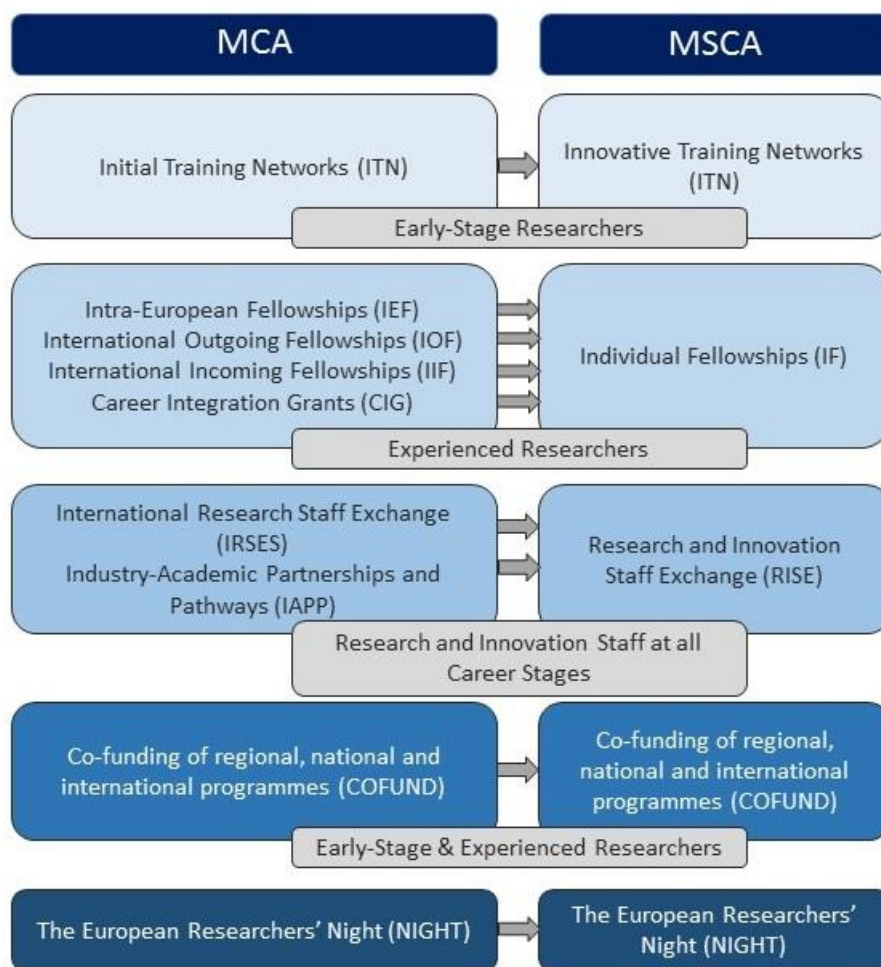
Figure 1 illustrates the types of actions through which the programme is implemented.

²⁶ More information here: http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm

²⁷ A detailed description of individual actions implemented under Horizon 2020 can be found on the programme's website: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/marie-sklodowska-curie-actions>

²⁸ REA's performance in implementing the programme is monitored by the European Commission, using a set of Key Performance Indicators (KPI). For more information see: https://ec.europa.eu/info/departments/research-executive-agency_en

Figure 1. Marie Curie Actions (FP7) and Marie Skłodowska-Curie Actions (Horizon 2020)²⁹



Source: ICF

1.2 Objectives of the evaluation

This evaluation was conducted in the broader perspective of the overall Horizon 2020 interim evaluation. According to the Regulation (EU) No 1291/2013 that established Horizon 2020, the interim evaluation of the programme is mandatory and clearly defined in the legal base³⁰. The H2020 interim evaluation results will be used to prepare for the ex-ante impact assessment of the future Framework Programme, which is expected to start in 2017.

Given the evolution from Marie Curie Actions (MCA) under the FP7 People Programme to Marie Skłodowska-Curie Actions (MSCA) –both referred to as MSCA hereafter– under the Horizon 2020, this assignment was composed of two complementary evaluations, namely:

- An ex-post evaluation of Marie Curie Actions and European Researchers' Night under the FP7 People Specific Programme (2007-2013)³¹; and

²⁹ For the sake of simplicity both programmes are referred to as MSCA throughout the report.

³⁰ Regulation (EU) No 1291/2013 of 11 December 2013 establishing Horizon 2020. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0104:0173:EN:PDF>

³¹ Excluding the EURAXESS initiative.

- An interim assessment of the MSCA part of Horizon 2020, from 2014 until June 2016.

The two overarching objectives of this evaluation were to:

- Improve the programme's implementation and provide a solid evidence base to design future activities – notably by outlining key aspects for the design of the remaining years of MSCA under Horizon 2020; and
- Prepare for the ex-ante impact assessment of the future Framework Programme for Research and Innovation (including beyond 2020).

1.2.1 Scope of the assignment

1.2.1.1 Actions and time-frame

The evaluation covered both the MSCA and European Researchers' Night under FP7 (2007-2013) and MSCA from 2014- June 2016 under Horizon 2020.

1.2.1.2 Geographical scope

The evaluation covered:

- The EU28 Member States (MS) and their overseas countries and territories.
- Associated Countries, i.e. countries that signed an agreement with the EU under Article 7 of the Horizon 2020 Regulation³², as well as associated countries under FP7.³³ These countries participate in Horizon 2020 under the same conditions as EU Member States.³⁴
- Other countries in the rest of the world (unless they were explicitly excluded in calls for proposals).

1.3 Method of approach and sources of evidence

A mixed method approach was chosen for the present study, to allow a coherent response to evaluation questions listed in Annex 2. The method consisted of the following elements:

- An in-depth literature review to provide context for the evaluation and help to finalise the method of approach;
- A review and analysis of programme data provided by the European Commission, including programme activities up to 1st January 2017;
- Four major online surveys of funded researchers and a comparison group of researchers, and funded organisations and a comparison group of organisations;
- 60 telephone interviews with EU stakeholders, national policymakers, researcher representatives and experts on human resources in research;
- 18 case studies on individual MSCA projects, presenting a purposive selection of different types of actions across FP7 and Horizon 2020;
- Bibliometric analysis of MSCA supported researchers (MSCA fellows);
- A social network analysis of the MSCA programme throughout FP7 and Horizon 2020 up to June 2016.

³² http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

³³ See the list of FP7 Third Country agreements: ftp://ftp.cordis.europa.eu/pub/fp7/docs/third_country_agreements_en.pdf

³⁴ As of 15th August 2016, sixteen countries were associated to Horizon 2020: Georgia, Armenia, Tunisia, Iceland, Norway, Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, Turkey, Israel, Moldova, Switzerland (partial association), Faroe Islands and Ukraine

The evaluation collected feedback, views and opinions from two main target groups

- Researchers, both early stage researchers and experienced researchers – the evaluation collected data on participants of the programme and non-participants (comparison group); and
- Organisations funded by the programme, organisations participating in MSCA which did not receive EU funding (partner organisations) and organisations which were unsuccessful in applying for programme funding – these groups include universities, research institutions, businesses and other socio-economic actors, such as civil society organisations.

At the institutional level, unsuccessful applicants which were evaluated above the quality threshold were used as a comparison group. At the individual level, a comparison group of successful, established researchers in similar research fields was constructed using bibliometric data in Scopus³⁵. This was seen as the best approach to conduct a counterfactual analysis at the individual level, given the data at hand.³⁶ Whilst reliance on a bibliometric approach introduced some bias towards researchers who have published in peer-reviewed journals and the comparison group is also more senior than the MSCA fellows with which they are compared, this approach allowed to compare MSCA fellows to established researchers who work in similar research areas.

Table 1 below provides an overview of the online surveys conducted.

Table 1. Online surveys

	# Contacted	# complete Responses	% Response Rate
ITN fellows	7 832	2 758	35%
IF fellows	11 291	1 657	15%
COFUND fellows	7 274	815	11%
RISE/IAPP/IRSES supported staff	9 580	745	8%
IF, ITN, COFUND funded organisations	19 308	2 211	11%
NIGHT funded organisations	1 577	142	9%
RISE/IAPP/IRSES funded organisations	4 800	759	16%
Comparison group researchers	35 136	4 466	13%
Control group organisations	38 538	5 405	14%

Source: ICF online surveys.

³⁵ Scopus is a bibliographic database containing abstracts and citations for academic journal articles. It covers nearly 22 000 titles from over 5 000 publishers, of which 20 000 are peer-reviewed journals in the scientific, technical, medical, and social sciences (including arts and humanities). As of 2015, Scopus contains abstracts of around 55 million individual publications. It is owned by Elsevier and is available online by subscription. Searches in Scopus also incorporate searches of patent databases.

³⁶ It should be considered here that the European Commission has limited information about individual researchers applying for MSCA fellowships. Furthermore, career trajectories and patterns differ across scientific disciplines, as well as individual national and institutional context, hence matching by individual research field and context are important.

Note: The numbers in the column #contacted excludes bounced email-invitations. ITN fellows: 60 bounced; IF, ITN, COFUND funded organisations: 1 bounced; Comparison group researchers: 2 187 bounced. Source: ICF online surveys.

The analysis of programme data provided by the European Commission and REA contributed to the evaluation of the programme's effectiveness, efficiency as well as relevance. This report uses the following definitions:

- Participations – individual participations in projects. The same organisation can have multiple project participations across different projects.
- Participants – number of discrete organisations funded by the programme, i.e. the number of organisations linked to a discrete (unique) participant ID.
- Applications – individual organisations in each proposal. The same organisation might have submitted multiple applications over time.
- Applicants – number of discrete applicants which have submitted proposals, i.e. the number of organisations linked to a discrete (unique) applicant ID.

In addition to primary and secondary data collected via the method outlined above, the study reviewed a number of additional sources which were made available by the European Commission:

- A survey of MSCA fellows conducted by the Marie Curie Alumni Association in 2015 (3 095 respondents);
- An evaluation survey of MSCA fellows at end of their fellowship, conducted by the Research Executive Agency in 2016 (5 767 respondents);
- A follow up survey of MSCA fellows, three years after the end of their fellowships, conducted by the Research Executive Agency in 2016 (1 042 respondents respectively);
- Economisti Associati, 2014. Marie Curie researchers and their long-term career development: A comparative study;
- Avramov, D., 2015; FP7 ex-post evaluation. PEOPLE Specific Programme (2007-2013) including annexes; and
- PPMI, 2013, FP7 Marie Curie Actions Interim Evaluation.

Whilst the approach chosen was robust and introduced new elements compared to previous evaluations, limitations to the data available were also evident. In particular, improving availability and quality of data on individual level participants (i.e. fellows) as well as applicants would help to add value in future evaluations of the programme.

1.4 Programme objectives and intervention logic

The MSCA programme is a key component of meeting the overall strategic objectives of Horizon 2020, evident in the overarching objectives of the Framework Programme.

"There is a critical need to reinforce, widen and extend the excellence of the Union's science base and to ensure a supply of world-class research and talent to secure Europe's long term competitiveness and well-being. [...] These activities should aim at building competence in the long term, focusing strongly on the next generation of science, systems and researchers, and providing support for emerging talent from across the Union and from associated countries. Union activities to support excellent science should help consolidate the European Research Area (ERA) and make the science system of the Union more competitive and attractive on a global scale."³⁷

³⁷ COUNCIL DECISION of 3 December 2013 establishing the specific programme implementing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decisions 2006/971/EC, 2006/972/EC, 2006/973/EC, 2006/974/EC and 2006/975/EC; REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11

Beyond the overarching objectives of Horizon 2020, MSCA addresses four specific objectives, as well as a number of issues which are cross-cutting throughout the Horizon 2020 programme.³⁸ Listed below are the five specific programme objectives of MSCA as outlined in the legal basis of Horizon 2020, and the extent to which they overlap partially with or encompass Horizon 2020 cross-cutting issues:

- **Specific Objective 1 (SO1) - Fostering new skills by means of excellent initial training of researchers** – the goal of SO1 is to train a new generation of creative and innovative researchers, and enable them to convert knowledge and ideas into products and services for economic and social benefit across Europe. It is mainly implemented through the Innovative Training Networks (ITN).
- **SO2 – Nurturing excellence by means of cross-border and cross-sector mobility** – the goal of SO2 is to enhance the creative and innovative potential of researchers at all career levels by creating opportunities for cross-border and cross-sector mobility. It is implemented mainly through Individual Fellowships (IF).
- **SO3 – Stimulating innovation by means of cross-fertilisation of knowledge** – The goal of SO3 is to reinforce international cross-border and cross-sector collaboration in research and innovation by means of exchanges of research and innovation personnel. It is implemented through Research & Innovation Staff Exchanges (RISE).
- **SO4 – Increasing structural impact by co-funding activities** – The goal of this specific objective is to increase the numerical and structural impact of MSCA and to foster excellence at national level in researchers' training, mobility and career development by leveraging additional funds and co-funding activities at the international, national or regional level, and is implemented through COFUND actions.

In addition to these four specific objectives, the programme also aims at raising awareness of the attractiveness of research careers and at disseminating research and innovation results emerging from MSCA projects. This part of the programme is mainly implemented through the European Researchers' Night (NIGHT).

The four core objectives outlined in the legal basis of the programme cover a number of cross-cutting objectives of Horizon 2020, as outlined in Table 3 below.

Table 3. MSCA specific objectives and cross-cutting objectives of Horizon 2020

MSCA SO	Horizon 2020 cross-cutting objectives
SO1	Facilitating cross-border and cross-sector mobility of researchers; interdisciplinary and cross-sectoral research and innovation; SME involvement in research and innovation and broader private sector participation; enhancing the attractiveness of research professions; and areas relating to bridging from discovery to market application
SO2	Facilitating cross-border and cross-sector mobility of researchers; interdisciplinary and cross-sectoral research and innovation; SME involvement in research and innovation and broader private sector participation; enhancing the attractiveness of research professions; gender dimension (implicitly); framework conditions in support of the flagship

December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC.

³⁸ Ibid.

	initiative Innovation Union (implicitly); international networks for excellent researchers and innovators (implicitly); cooperation with third countries
SO3	Facilitating cross-border and cross-sector mobility of researchers; interdisciplinary and cross-sectoral research and innovation; SME involvement in research and innovation and broader private sector participation; areas relating to bridging from discovery to market application; fostering the functioning and achievement of the ERA and of the flagship initiative Innovation Union (implicitly), framework conditions in support of the flagship initiative Innovation Union (implicitly); contributing to all relevant Europe 2020 flagship initiatives (implicitly)
SO4	Facilitating cross-border and cross-sector mobility; interdisciplinary and cross-sectoral research and innovation; enhancing the attractiveness of research professions

Source: Horizon 2020 legal basis.

The comparison with the objectives of the Specific Programme People in the Seventh Framework Programme for Research and Technological Development (FP7)³⁹ shows a high degree of continuity in the specific objectives SO1, SO2 and SO4. However, the objectives and structure of MSCA have evolved over time to reflect emerging needs at the time by⁴⁰:

- Giving greater prominence to inter-sectoral mobility and addressing societal needs;
- Giving greater prominence to societal and innovation impacts, as is the case across the Horizon 2020 framework programme;
- Addressing emerging cross-cutting issues in research and innovation, such as Open Science, Responsible Research and Innovation; and
- Stronger emphasis was given to the implementation and adoption of the Charter & Code for Researchers as well as the Principles for Innovative Doctoral Training (IDT), as evident by the introduction of the Industrial Doctorates scheme and the revised setup of COFUND, which under Horizon 2020 co-funds doctoral training and focuses on the adoption of the IDT principles.

The intervention logic of the programme therefore encompasses part of the Horizon 2020 overarching objective, the five core objectives and the remaining cross-cutting issues. These programme objectives respond to a number of specific and global challenges which are discussed in more detail in section 2 (chapter on relevance of the programme).

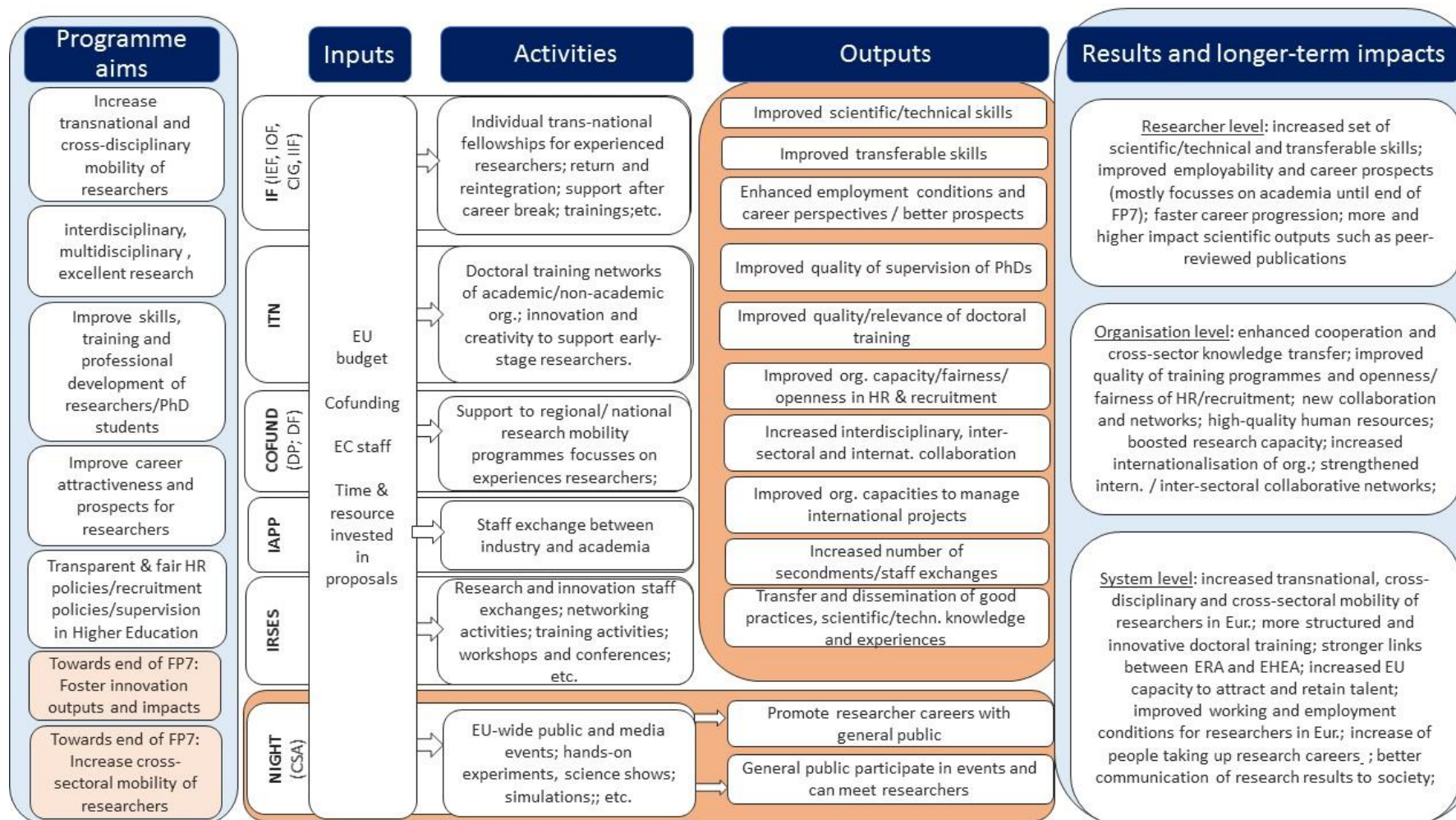
Figure 2 and Figure 3 overleaf present the intervention logic for the programme in FP7 and Horizon 2020 respectively. While the specific programme objectives identified are covered, some of the cross-cutting objectives listed above are not presented, as they cannot be clearly related to SMART indicators.⁴¹ These include a number of the cross-cutting issues flowing down from the overall Horizon 2020 objectives, such as the European Research Area (ERA).

³⁹ COUNCIL DECISION of 19 December 2006 concerning the specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013) (2006/973/EC).

⁴⁰ PPMI (2013) FP7 Marie Curie Actions Interim evaluation. Implementing Framework contract EAC/50/2009. Final Report.

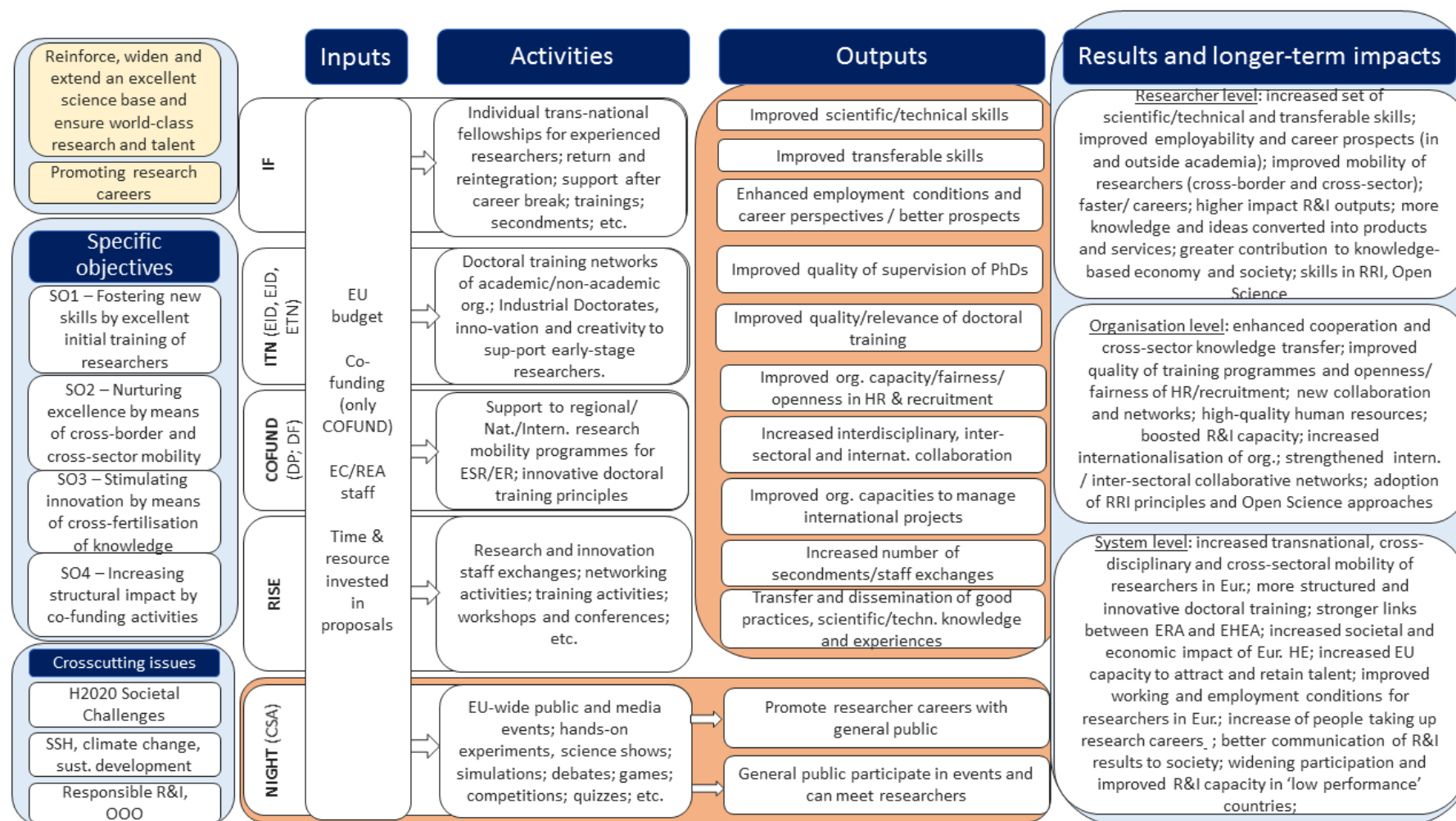
⁴¹ Specific, Measurable, Assignable, Realistic, Time-Related

Figure 2. Intervention logic of the Marie Curie Actions (FP7)



Source: ICF

Figure 3. Intervention logic of the MSCA (H2020)



Source: ICF

1.5 Implementation state of play⁴²

1.5.1 Overview of programme activities and funding

The FP7 and Horizon 2020 MSCA projects have been and are one of the most popular EU programmes for research funding.

Overall, the programme saw a large increase in demand from FP7 to Horizon 2020, which was only partially met by an increase in programme budget. Despite a EUR 1.4 billion increase in programme budget, the programme's oversubscription rate significantly increased from FP7 to Horizon 2020. In conclusion, the data reviewed suggests that from FP7 to Horizon 2020, there was a continuing need for MSCA funding.

- Under FP7, which ran from 2007-2013, there were 50 845 proposals submitted by 109 764 applicants;
- Under Horizon 2020 from 2014 up to January 2017, 21 644 proposals have been submitted by 76 115 applicants;
- In total, there were 20 187 project participations in MSCA under FP7, and 7 850 project participations in MSCA projects under Horizon 2020 so far.⁴³

11 127 MSCA projects were supported under FP7, with a total project budget of EUR 5.5 billion and receiving a total EU contribution of EUR 4.8 billion. Around EUR 700 million were provided through own resources of participating organisations. A total of 3 713 unique organisations participated (either as a participant organisation or a coordinating organisation) in FP7 MSCA projects. At the time of this evaluation, 9 459 out of 11 127 MSCA projects have been completed, whereas 1 668 projects are still ongoing.

3 246 MSCA projects were funded so far receiving a total EU contribution of EUR 2.1 billion. A total of 2 182 unique organisations have participated (either as a participant organisation or a coordinating organisation) in the MSCA so far. In addition, 411 partner organisations that were not funded directly by the programme participated so far. At the time of this evaluation, 502 out of 3 246 MSCA projects have been completed, whereas 2 744 projects are still ongoing.

On the individual level, the programme funded around 50 000 fellows under FP7, whilst under Horizon 2020 so far the programme is expected to support around 9 000 fellows per year, and 65 000 fellows in total across the seven year programme duration (2014-2020).⁴⁴ The programme is largely one that supports 'brain circulation'⁴⁵, where research & innovation leaders across Europe host the largest proportion of fellows, but at the same time a number of low-performing Member States and Associated Countries⁴⁶ use the programme to attract 'returnees', fellows of the same nationality returning to their country of origin.

Table 4 provides an overview of the state of implementation of MSCA programmes.

⁴² The data analysed in this section has been provided by DG EAC in January 2017.

⁴³ The data analysed in this section has been provided by DG EAC in January 2017. Horizon 2020 figures might have changed. Participant figures exclude partner organisations for Horizon 2020.

⁴⁴ Source: DG EAC estimations. DG EAC also estimated that including FP7 projects, the programme had funded around 100 000 fellows overall up to March 2017 across FP7 and Horizon 2020.

⁴⁵ Johnson, Jean and Mark Regets, 1998, International Mobility of Scientists and Engineers to the United States: Brain Drain or Brain Circulation, National Science Foundation (NSF 98-316).

⁴⁶ 'Widening countries', <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/spreading-excellence-and-widening-participation>

Table 4. Implementation state of play - overview

Framework Programme	Type of Action	Nr. of projects	EC funding, in EUR m	Average EC funding, EUR m	Nr. of participants
Seventh Framework Programme (FP7)	Initial Training Networks (ITN)	656	2 178	3.3	5 680
	Individual Fellowships (IEF, IOF, IIF, CIG)	9 040	1 489	0.2	9 329
	IRSES, IAPP	895	585	0.7	3 398
	COFUND	170	531	3.1	176
	Total MSCA (FP7) ⁴⁷	11 127	4 824	0.4	20 187
Horizon 2020	Innovative Training Networks (ITN)	389	1 259	3.2	3 195
	Individual Fellowships (IF)	2 444	451	0.2	2 467
	Research and Innovation Staff Exchange (RISE)	265	223	0.8	1 718
	COFUND	55	164	3	99
	Total MSCA (H2020) ⁴⁸	3 246	2 115	0.6	7 852

Source: ICF CORDA analysis 1 January 2017. Notes: The 2016 calls for IF and COFUND were not completed by this date and therefore the data refer only to 2014 and 2015 for these two actions. In contrast, the other actions cover calls in 2014, 2015 and 2016.

⁴⁷ Including Coordination and Support Actions (CSA).

⁴⁸ Including Coordination and Support Actions (CSA), as of January 2017.

The programme's oversubscription rate, measured as the extent to which high quality proposals exceed projects funded, has doubled between FP7 and Horizon 2020, largely due to an ever growing demand for funding of Innovative Training Networks (ITN) and Individual Fellowships (IF). These two types of actions also represent the majority of projects and EU budget spent, accounting for 76% of EU contributions allocated to MSCA in FP7 and 80% of MSCA's EU contributions under Horizon 2020 so far.

Table 5. Success rates and oversubscription in MSCA

Oversubscription rate⁴⁹					
	ITN	IF	IRSES/IAPP /RISE	COFUND	Total
FP7 (MSCA)	482%	220%	67%	38%	213%
Horizon 2020 (MSCA)	988%	424%	129%	204%	444%
Proposal success rate					
	ITN	IF	IRSES/IAPP /RISE	COFUND	Total
FP7 (MSCA)	11%	22%	39%	52%	22%
Horizon 2020 (MSCA)	8%	16%	28%	40%	11%

Source: ICF CORDA analysis

Under FP7, EUR 4.7 billion was initially budgeted for the implementation of MSCA, all of which has been committed to funded projects. The overall budget allocated to MSCA projects is EUR 6.2 billion for the period 2014-2020, out of which EUR 2.1 billion or 34% had been committed as of January 2017. This is slightly above the overall share of Horizon 2020 budget allocated so far, which stood at 27% in January 2017.

Under FP7, MSCA proposals had a slightly higher success rate (22%) than average across the whole framework programme (19%). In Horizon 2020 overall, success rate by proposal for MSCA is to date below the Horizon 2020 average of 12%. However MSCA in Horizon 2020 is substantially more oversubscribed at 444%, compared to 278% of oversubscription for Horizon 2020 overall as of January 2017.

1.5.2 Overview of participation

1.5.2.1 Key figures – programme participation and applications for funding

The vast majority of participations in MSCA were from Higher Education Institutions (HES), at 62% of all participations in Horizon 2020 and 65% of all participations in FP7. Compared to the overall framework programmes, MSCA saw a much higher proportion of higher education organisations participating throughout, although the programme saw a significant increase of business participation in Horizon 2020 so far, when compared to FP7. When looking at distinct beneficiaries, private for profit organisations account for 43% of all MSCA beneficiaries, compared to 16% of all participations, i.e. the number of projects in which they are beneficiaries. This shows that companies on average participate less often in the programme, when compared to higher education institutions (1.2 times compared to 6.5 times, on average in Horizon 2020).

Success rates by participations in MSCA were below those of the overall framework programmes – a notable exception being small and medium enterprises which, so far,

⁴⁹ $[(\text{Number of high quality proposals}/\text{number of retained proposals (mainlist)})-1] * 100$.

have seen a slightly better success rate in MSCA when compared to Horizon 2020 overall. Success rates by participations were consistently lower in MSCA when compared to the respective overall Framework Programme. Overall success rates by applications stood at 19% for MSCA in FP7, and decreased to 13% in Horizon 2020 MSCA so far. This compares to 22% in FP7 overall, and 14% across all of Horizon so far. Therefore, success rates in MSCA decreased less when compared to the overall decrease from FP7 to Horizon 2020 so far (-6% in MSCA, compared to -8% between the two Framework Programmes).

Table 6 below provides an overview of MSCA applicants and participants in Horizon 2020. Table 7 below provides an overview of MSCA applicants and participants in FP7.

Table 6. MSCA applicants and participants in Horizon 2020⁵⁰, (+/- indicate change vis-à-vis FP7)

	Marie Skłodowska- Curie Actions in Horizon 2020					All of Horizon 2020		
	Share of applications	Share of participations	Share of coordinators	Share of EC funding	Success rate	Share of applications	Share of participations	Success rate
HES	58% (-)	62% (-)	76% (+)	67% (+)	13% (-)	37%	33% (-)	12% (-)
REC	18% (-)	19% (-)	21% (-)	19% (-)	13% (-)	18% (-)	22% (+)	17% (-)
PRC	20% (+)	16% (+)	2% (-)	12% (+)	12% (-)	37% (+)	33% (+)	13% (-)
PUB	2%	1% (-)	1% (-)	2% (-)	11% (-)	4% (-)	6% (+)	25% (-)
Other	2%	2% (+)	1% (-)	1% (-)	19% (-)	4% (+)	5% (+)	19% (-)
Total	100%	100%	100%	100%	13%	100%	100%	14%
SME	n/a	9% (+)	1%	6%	13% (+)	26% (+)	21% (+)	12% (-)

Source: ICF CORDA analysis

Table 7. MSCA applicants and participants in FP7

	Marie Curie Actions, FP7					All of FP7		
	Share of applications	Share of participations	Share of coordinators	Share of EC funding	Success rate	Share of applications ⁵¹	Share of participations	Success rate
HES	64%	65%	51%	62%	19%	37%	37%	21%
REC	19%	22%	33%	22%	22%	19%	25%	27%
PRC	13%	11%	9%	10%	15%	26%	30%	23%
PUB	2%	2%	5%	4%	17%	6%	5%	26%
Other	2%	1%	2%	2%	10%	2%	3%	9%
Total	100%	100%	100%	100%	19%	100%	100%	22%
SME	11%	6%	5%	6%	10%	24%	19%	20%

Source: ICF CORDA analysis

⁵⁰ HES; Higher Education, REC: Research Organisations; PRC: Private Sector; PUB: Public Institutions.

⁵¹ Missing share are FP7 applicants for which no organisation type details were available.

1.5.2.2 Newcomers and top participants

Overall, 28% of organisations participated in MSCA in Horizon 2020 had not participated in FP7. This compares to 52% for Horizon 2020 overall, therefore suggesting that MSCA were to a lesser extent accessible to ‘newcomer’ organisations – likely a result of the programme’s strong focus on research excellence, and the dominance of a small group of organisations. In terms of newcomer organisations in Horizon 2020 so far, non-profit and civil society organisations within the ‘other participants’ category have seen the largest share of newcomers (64%). Furthermore, 47% of private sector participants in MSCA had not participated in FP7. Universities participating in MSCA have the lowest share of newcomers, at 6% so far.

The top 100 participating organisations⁵² in MSCA under Horizon 2020 account for 3 159 participations so far (40% of all MSCA participations), and have received EUR955 million (45% of all EU funding allocated so far). This compares to the top 100 organisations across Horizon 2020 having received 33% of EU funding so far, indicating that participation and EU funding under MSCA is more strongly concentrated in a small group of top participants. Under FP7 this concentration effect was more pronounced overall, but slightly less pronounced in MSCA – as the top 100 participating organisations received 43% of EU funding (EUR 2 billion) in MSCA, compared to 35% across all of FP7.

Across both Framework programmes, the largest share of HES participations in MSCA stemmed from the United Kingdom, at 27%. In second and third place are Germany at 9% and the Netherlands at 7%. Participations of private companies were led by Germany, with 16% of all industry participation coming from German firms across both framework programmes, ahead of the United Kingdom (14%) and Italy (9%). Participations from research organisations (REC) were dominated by France (22% across both Framework Programmes), ahead of Spain (18%) and Germany (15%). These participation patterns in part mirror the differences between national research and innovation systems.⁵³

The programme sees participation from top universities across Europe and the world. Using U-Multirank data on research and research linkages⁵⁴, MSCA supported 7 of the top 10 universities worldwide, and 37 of the top 50 universities worldwide under Horizon 2020. These 37 institutions represent 8% of participations under MSCA in Horizon 2020 so far. Due to the majority of top 50 universities being located outside the EU, the EU funding allocated to these organisations only represents a small proportion of overall EU funding spent in MSCA under Horizon 2020 so far (0.2%).

1.5.2.3 Business participation

As can be seen above in Table 6 and Table 7, SME involvement in Marie Curie projects was significantly below the share of SME participation in the respective Framework Programme overall, but saw a substantial increase from 6 to 9% between MSCA in FP7 and MSCA under Horizon 2020 so far.

SME involvement in Marie Curie actions under FP7 was particularly high in IAPP actions (38% of all participations, taking into account partner organisations) and ITN (27%). In Horizon 2020 the picture was similar, with RISE (27%) and ITN (26%) seeing the highest share of SME participations so far.

⁵² In terms of project participations.

⁵³ E.g. a strong role of universities and the higher education sector in the UK, and a strong presence of research organisations in Germany and France.

⁵⁴ <http://www.umultirank.org/#!/home?name=null&trackType=home>

In Horizon 2020, SMEs participated in the MSCA slightly more actively than large businesses. SMEs and large businesses accounted for roughly equal number of participations across all types of funding instruments across MSCA. This equity between large businesses and SMEs remained stable in each of the funding instruments in both framework programmes.

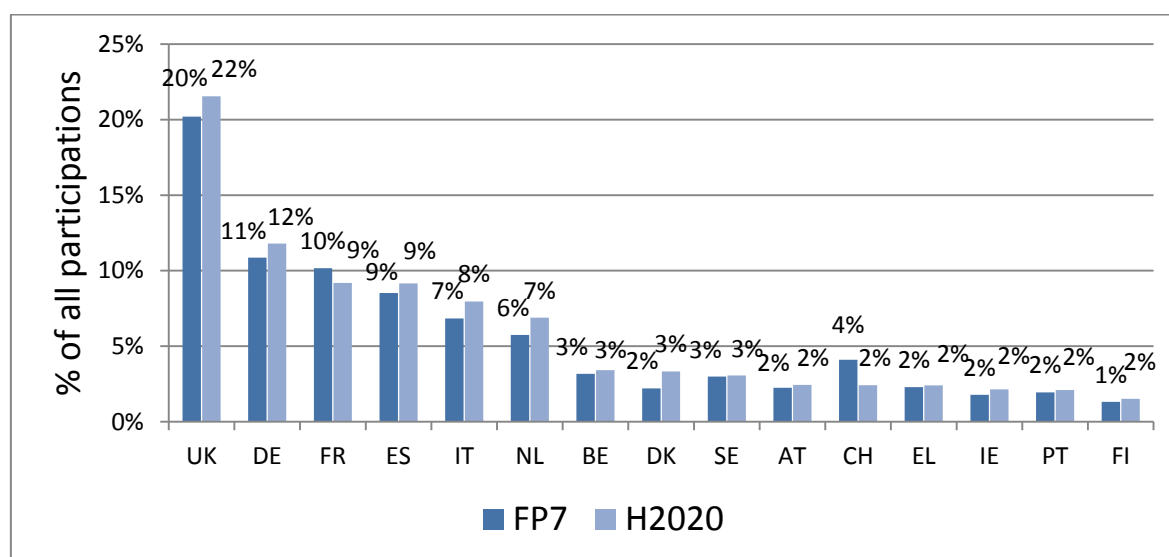
The motivations to participate in the MSCA differed between large businesses and SMEs. A recent study conducted by DG EAC suggests that SMEs were mainly motivated to participate in a specific project in order to advance their product development efforts and to achieve easily marketable research results. Meanwhile, larger businesses emphasized the importance of gaining access to potential employees and the potential expansion of their collaborative networks in contrast to the outcomes of the specific project.⁵⁵

1.5.2.4 Participation by country

Compared to the overall framework programmes, EU13 (new Member States) and so-called Widening Countries⁵⁶ represented a smaller proportion of MSCA participations. In fact, the relative proportion of participations from Widening Countries decreased in MSCA under Horizon 2020, when compared to MSCA in FP7.

Figure 4 details the top twenty EU member states and Associated Countries, in terms of their overall participation in all MSCA projects under the FP7 and Horizon 2020 schemes. It shows that there was little change in terms of the participation patterns by country.

Figure 4. Top 15 countries participating in MSCA projects in FP7 and H2020, out of all participations



Source: ICF CORDA analysis

⁵⁵ PPMI, AIT and Optimity (2017) Study of business participation and entrepreneurship in MSCA actions (FP7 and Horizon 2020). Final report to DG Education, Youth, Sports and Culture.

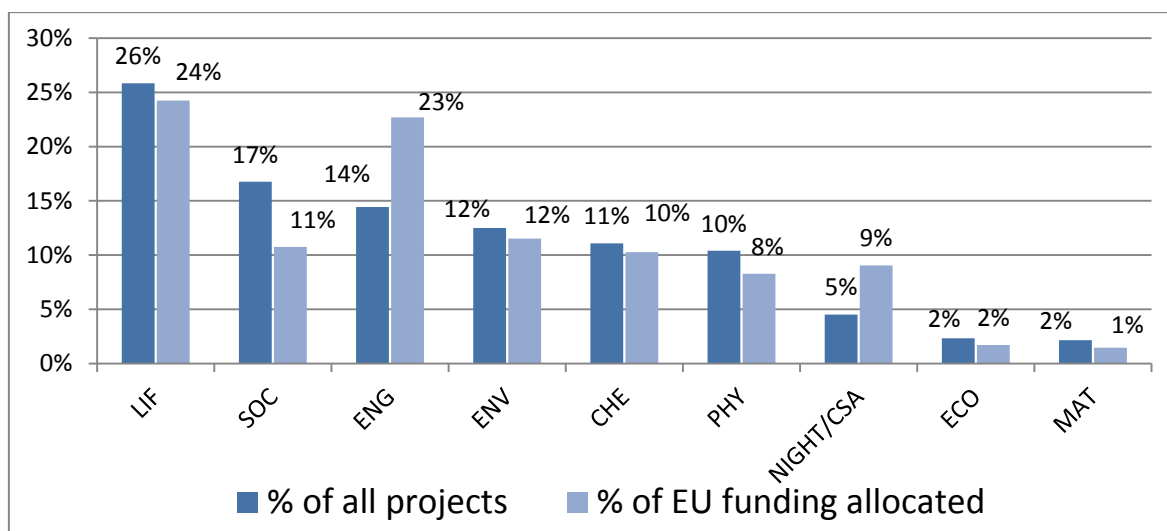
⁵⁶ The EU Member States considered as Widening Countries in July 2017 were: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia and Slovenia - the Associated Countries considered as Widening Countries in July 2017 were Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Former Yugoslav Republic of Macedonia, Georgia, Moldova, Montenegro, Serbia, Tunisia, Turkey and Ukraine. See: <https://ec.europa.eu/research/regions/index.cfm?pg=widening> [accessed 11th July 2017].

An analysis of international participation in the programme is presented in section 4.2 below.

1.5.2.5 Programme activities by areas of research funded

The largest proportion of projects funded in MSCA so far is under the life sciences panel, followed by social sciences and engineering. In terms of EU funding allocated, almost half of the EU budget spent so far has been allocated to the life sciences and engineering panels (47%).

Figure 5. MSCA budget and projects by panel



Source: ICF CORDA analysis

Engineering has so far taken a larger part of the MSCA budget, compared to the number of projects in this area, due to taking a large share of the ITN projects which are generally larger in budget size.⁵⁷

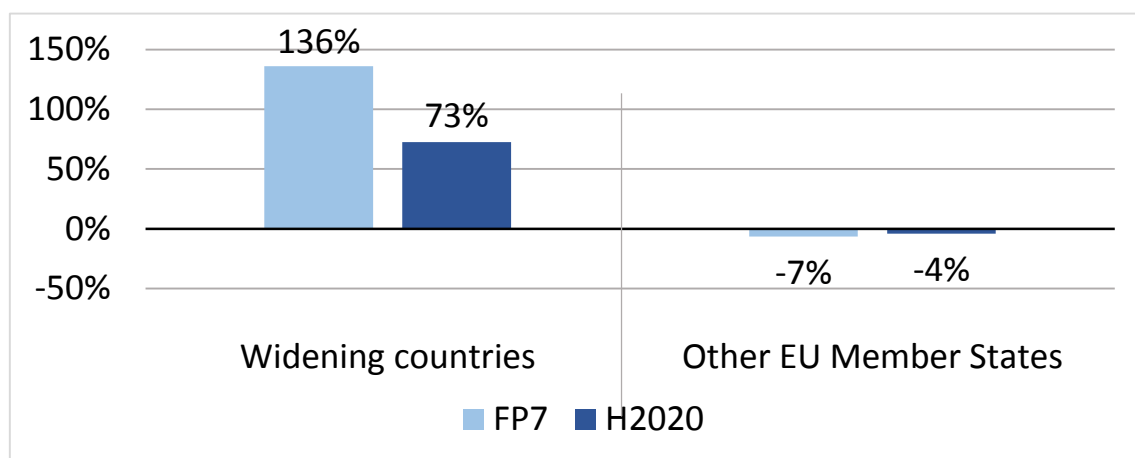
1.5.2.6 Country participation in context

Putting nominal levels of participation into context is an important performance metric to understand the relative performance of countries in the programme, as achieving a high share of funding having adjusted for other relevant factors such as national R&D investment or FTE researchers can also provide a more accurate picture of true performance.⁵⁸

⁵⁷ 29% of all ITN projects so far are ENG projects, compared to 14% of MSCA projects overall. As per Table 4, ITN projects receive a much larger average amount of EU funding than other types of MSCA (EUR3.2 million compared to EUR0.6 million average EU funding across MSCA so far).

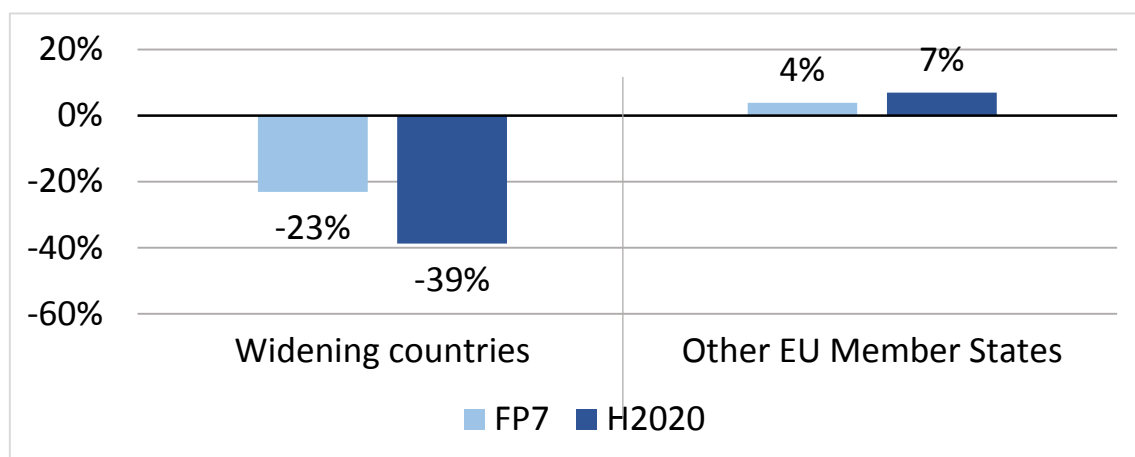
⁵⁸ Ratio of actual to expected participation shares = Share of total participation in programme period / Share of total EU GERD in the same period. For FTE researchers averages for each programme period were used.

Figure 6. MSCA participation, factored by Gross Domestic Expenditure on Research and Development (GERD)



Source: ICF analysis of CORDA data, Eurostat [rd_e_fundgerd]. Note: 0% indicates that countries have participated in the programme in line with their share of R&D investment during the programme duration.

Figure 7. MSCA participation, factored by FTE researchers



Source: ICF analysis of CORDA data, Eurostat [rd_p_persocc]. Note: 0% indicates that countries have participated in the programme exactly in line with their average share of FTE researchers during the programme duration.

Figure 6 and Figure 7 above show that Widening Countries have been performing above what might have been expected adjusting for their R&D investment, and below what might have been expected adjusting for their number of researchers.

The analysis also shows that the relative performance of Widening Countries in Horizon 2020 MSCA was below their performance during FP7 MSCA.

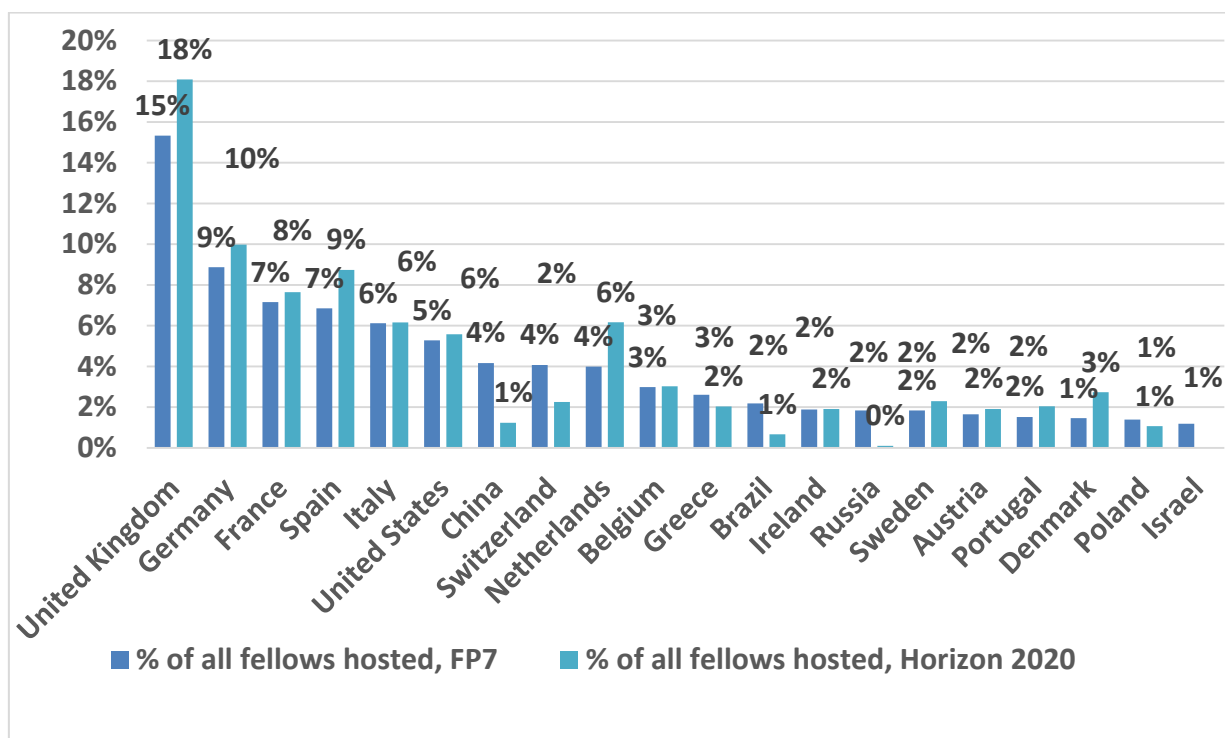
1.5.3 Researchers supported by the programme

On the individual level, the programme has supported around 100 000 individual fellowships and staff exchanges over the past 20 years.

Figure 8 below shows that between FP7 and Horizon 2020, there has been very little change as regards where fellows are hosted. In line with the programme's focus on excellence, a large proportion of fellows and research staff are hosted in countries

which are performing strongly in terms of their research and innovation performance.⁵⁹ Excluding RISE staff exchanges, around a third of fellows so far were hosted in the United Kingdom and Germany (32% in FP7 and 35% in Horizon 2020 so far), whilst widening countries hosted around 5% of all fellows in FP7, and maintained this share in Horizon 2020. If staff exchanges are included, the picture changes but between them the United Kingdom and Germany still host 24% in FP7 and 28% in Horizon 2020, respectively (Figure 8).

Figure 8. Fellows and staff exchanges hosted, FP7 and Horizon 2020, top 20 countries



Source: ICF CORDA analysis

The composition of fellows by nationality also remained largely unchanged between FP7 and Horizon 2020 so far, with the notable exception of Italy and Spain increasing their respective share of fellows from 12 to 15%, and 9% to 11% respectively (see Annex 1 for details).

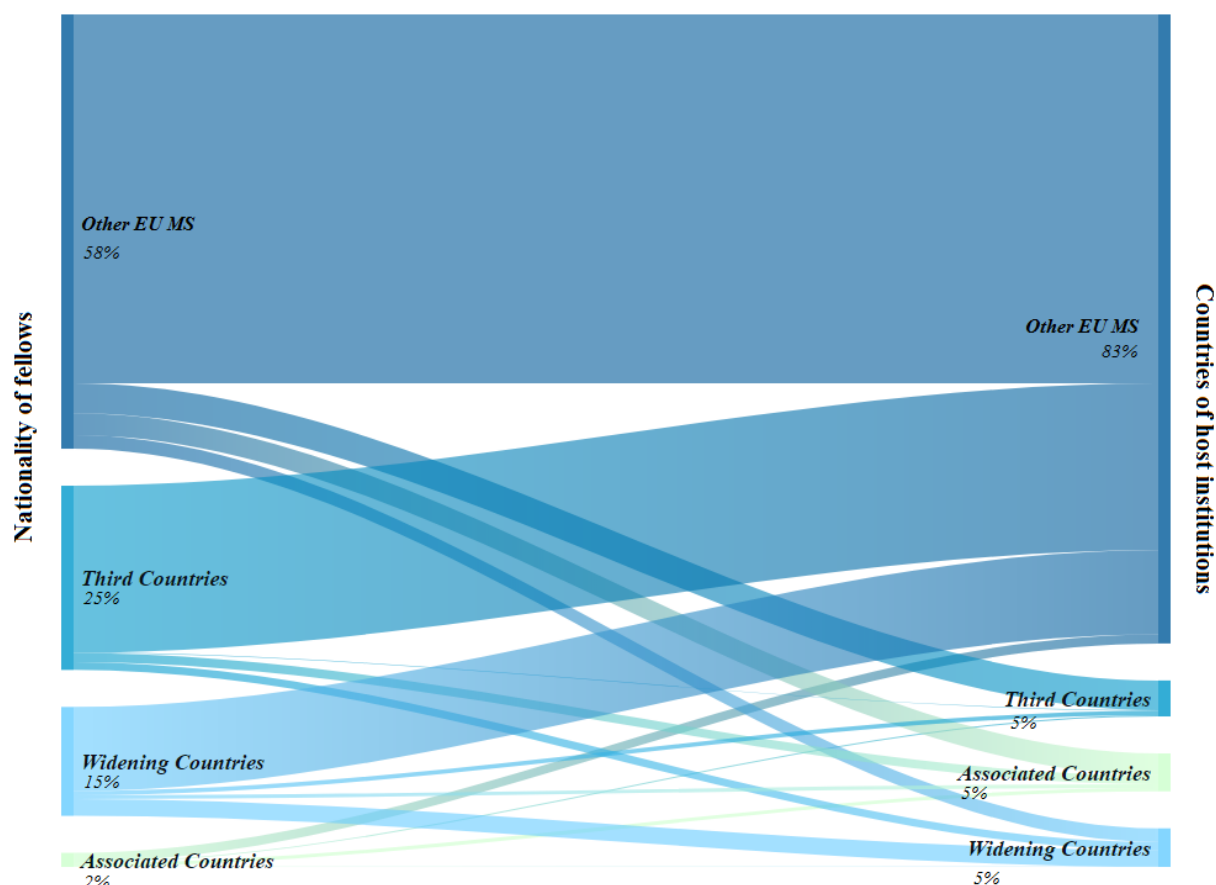
When setting the number of foreign fellows into context, by using Eurostat data on foreign doctoral students, the Netherlands, Germany, Spain and Italy received more MSCA fellows under the ITN actions than could be expected given their share of foreign doctoral students across the EU (7%, 6%, 6% and 4% more than would be expected), whilst France is the country doing considerably worse (receiving 10% less foreign MSCA fellows that would be expected). Other countries participating in MSCA are more or less receiving the amount of foreign ITN fellows that would be expected, given their share of foreign doctoral students hosted in the EU.⁶⁰

⁵⁹ See European Innovation Scoreboard for a useful country-level benchmark http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_de

⁶⁰ For this analysis we compared Eurostat [educ_uoe_mobs02], which provides statistics on foreign doctoral students from 2013-2015, with foreign fellows hosted under MSCA ITN, using CORDA data. Countries that received $\pm 2\%$ of what would be expected given Eurostat data were considered to be neither over- nor underperforming.

The programme exhibits elements of brain circulation, where both movements towards more established countries are visible, as well as a certain trend of fellows returning to their country of nationality.

Figure 9. Nationality of fellows compared with countries of host institutions, MSCA H2020



Source: ICF CORDA analysis, RISE staff exchanges excluded as they have an in-built return element

Across the survey respondents, 49% of fellows whose fellowship had ended indicated that they had stayed in the country of their host institution, suggesting that the programme supports a long-term move to another country in around half of the fellowships. IF fellows tended to stay in their host country slightly more frequently (53%) than ITN fellows (44%).

Figure 9 illustrates that, under Horizon 2020, the vast majority of fellows which hold a nationality from the Widening countries are hosted in other EU Member States.⁶¹

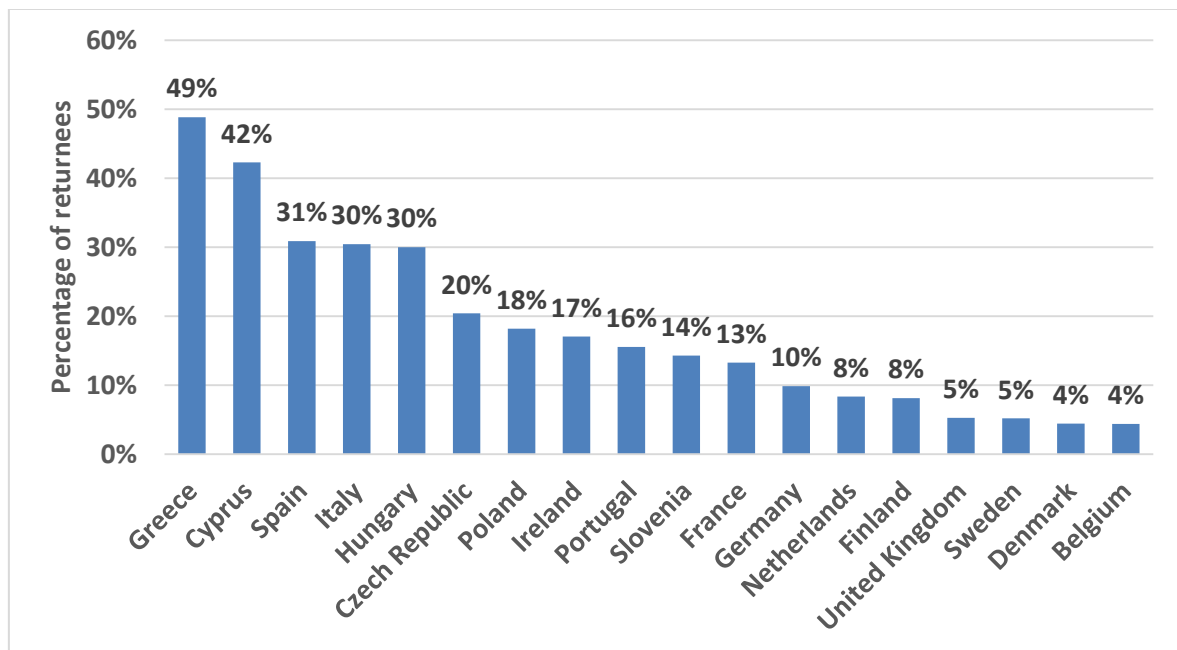
In contrast, there are significant numbers of fellows which are supported by the programme to return to their country of nationality. In particular Greece, Cyprus, Spain, Italy and Hungary have seen large proportions of fellows 'returning' to their country of nationality.

⁶¹ No robust data available for FP7. Furthermore, there is no robust data on the country of residence before the start of fellowship across all types of MSCA projects, therefore nationality was used instead. In this context it should also be noted that fellows cannot have spent more than twelve months in the country of host institution before starting their fellowship.

Mobility supported under MSCA also is subject to certain 'external effects'. For instance, the number of Ukrainian fellows hosted in Poland increased from FP7 to Horizon 2020, a development that might well be linked to the armed conflict in Ukraine during this period.

Therefore, it can be concluded that the programme supports 'brain circulation'. Whilst the overall trend seems to be building capacity of countries which have an established research and innovation landscape, there is also (albeit at smaller scale) evidence that the programme helps researchers in returning to countries outside of the leading performers.

Figure 10. Fellows with the same nationality as the host country in Horizon 2020 MSCA



Source: ICF analysis of CORDA data, countries with less than 20 fellows hosted are excluded. RISE exchanges are not included.

2 Relevance of the MSCA programme

Relevance refers to the extent to which an intervention (still) matches the (current) needs and problems.

2.1 Relevance of the programme objectives with regards to global challenges in the EU

2.1.1 The political context and EU objectives

The EU's political agenda is focussed on strengthening the EU's competitiveness, stimulating public and private investment, promoting growth and creating new and sustainable jobs.⁶² The Juncker Commission's priorities rely, amongst other factors, on the existence of a strong research base.⁶³

While needs differ across Member States, R&D is amongst the investments that Europe requires for smart, sustainable and inclusive growth⁶⁴ (the Europe 2020 objectives).⁶⁵ Human resources and open and excellent research systems, the Commission has noted, are key enablers of innovation⁶⁶ and a key element to achieve Europe's Sustainable Development Goals.⁶⁷

International competitors have been extending their science base, and between 2000 and 2013 the EU has reduced its global share of R&D spending from 1/4 in 2000 to around 1/5 in 2013, its share of scientific publications worldwide from around 1/3 in 2000 to around 1/4 in 2013, and its share of patents from more than 1/3 in 2000 to less than 1/4 in 2013⁶⁸. The US still has a larger proportion of high-impact publications than the EU –while producing fewer scientific publications–, suggesting that the US is more effective in producing the very best scientific outputs. The EU also underperforms in comparison to the US in terms of scientific outputs in key areas of growth and with large potential for commercial and economic impact –including nanotechnologies and nano-science, ICT, biotechnology and materials. China and

⁶² European Commission (2016) European Economic Forecast Autumn 2016. Institutional Paper 038. Economic and Financial Affairs, November 2016.
http://ec.europa.eu/economy_finance/publications/eeip/pdf/ip038_en.pdf

⁶³ Issue paper for the High Level Group on maximising the impact of EU Research and Innovation Programmes 3 February 2017. Section on "Contribution to Juncker priorities and current challenges". https://ec.europa.eu/research/evaluations/pdf/hlg_issue_papers.pdf See also Juncker, J.C. (2014) A new start for Europe: My agenda for jobs, growth, fairness and democratic change. https://ec.europa.eu/commission/sites/beta-political/files/juncker-political-guidelines-speech_en_0.pdf

⁶⁴ See also Issue paper for the High Level Group on maximising the impact of EU Research and Innovation Programmes 3 February 2017. Section on "Contribution to Juncker priorities and current challenges". Pp. 2-9
https://ec.europa.eu/research/evaluations/pdf/hlg_issue_papers.pdf

⁶⁵ European Commission (2016) European Economic Forecast Autumn 2016. Institutional Paper 038. Economic and Financial Affairs, November 2016.
http://ec.europa.eu/economy_finance/publications/eeip/pdf/ip038_en.pdf Research is critical to address pressing environmental challenges, such as global warming, bio-diversity loss or environment-related health concerns.

⁶⁶ European Commission (2016) European Innovation Scorecard. European Union, Belgium.

⁶⁷ European Commission (2011) Commission Staff Working Paper: Executive Summary of the Impact Assessment Accompanying the Communication from the Commission "Horizon2020 –the Framework Programme for Research and Innovation". COM (2011) 808 Final.

⁶⁸ European Commission (2016) 'Performance analysis of international participation in Horizon 2020. A support study for the interim evaluation of H2020' European Commission, October 2016.

South Korea have been increasing the number of high-impact publications in these areas at a faster speed than both the US and Europe.

In this context, the overall MSCA objective to generate excellent research and innovation to secure Europe's long-term competitiveness and well-being has increased in importance. The bottom-up approach of the programme provides the space for researchers to come up with their own solutions to major societal and research challenges. MSCA action is part of the "Excellent science" strand of H2020, which aims to strengthen the excellence of European research⁶⁹ and make the Union's research and innovation base more competitive globally. In line with this, the Decision establishing H2020 stated that:⁷⁰

"There is a critical need to reinforce, widen and extend the excellence of the Union's science base and to ensure a supply of world-class research and talent to secure Europe's long term competitiveness and well-being. The priority "Excellent science" should support the activities of (...) Marie Skłodowska-Curie actions (...). These activities should aim at building competence in the long term, focusing strongly on the next generation of science, systems and researchers, and providing support for emerging talent from across the Union and from associated countries. Union activities to support excellent science should help consolidate the European Research Area (ERA) and make the science system of the Union more competitive and attractive on a global scale. " (L347/966)

MSCA aims to address the global challenges identified above, through the achievement of four specific objectives⁷¹: two related to the enhancement of excellence; one related to cross-fertilisation of knowledge across sectors, countries and disciplines and one related to the stimulation of national and regional programmes to foster excellence through mobility for researchers' training, career development and staff exchanges. The relevance of each of these objectives is discussed below. On the whole, the specific objectives of MSCA are highly relevant in the current context as they are highly focused on the development of excellent researchers (and in particular the next generation of researchers), mobility and cross-fertilisation across sectors in order to make Europe's science system more attractive and further extend its contribution to innovation and growth.

2.1.2 SO.1: Fostering new skills by means of excellent initial training of researchers

As the European Commission recently noted: "highly-trained researchers are necessary to advance science and business competitiveness, which, in turn, are important factors in attracting and sustaining investment in Europe".⁷² MSCA has a key role in "building competence in the long term, focusing strongly on the next generation of science, systems and researchers, and providing support for emerging talent"⁷³ to consolidate the European Research Area and make the Union's science system more competitive and attractive globally.

⁶⁹ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 –the Framework Programme for Research and Innovation (2014-2020). OJ L347.

⁷⁰ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 –the Framework Programme for Research and Innovation (2014-2020). OJ L347.

⁷¹ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 –the Framework Programme for Research and Innovation (2014-2020). OJ L347.

⁷² European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. p.133. 29-05-2017.

⁷³ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020.

In order to produce excellent and innovative research, the EU needs to foster new skills through excellent initial training of researchers. The US has a larger proportion of high-impact publications than the EU, while producing fewer scientific publications. This suggests that the US is more efficient at producing the very best scientific outputs. Emerging countries, such as China, are increasingly producing cutting-edge research. This underlines the importance of actions, such as MSCA, to further develop the skills and training of current and future generations of European researchers (see also SO.2).

But Europe also needs to enhance and diversify the training offered to researchers to accelerate innovation, enhance the economic applications of research, and the career options of researchers. As the majority of doctoral candidates will not take up an academic career⁷⁴, the skills that they require to be employed in non-academic sectors has become a major concern⁷⁵. There is a need to broaden their skill base⁷⁶ and provide additional opportunities for professional development in doctoral programmes, for example in interdisciplinary and transferable skills such as project management, presentation and negotiation skills, bid writing and IPR management, entrepreneurship⁷⁷ or marketing and sales.

PhDs with this type of complementary skills training can be seen as able to “hit the ground running in an industry job”.⁷⁸ Entrepreneurship and knowledge transfer have been particularly identified in doctoral programmes across the globe as important, to stimulate the creation of new science-based firms.⁷⁹ Overall the concept of doctoral education is being broadened and is evolving alongside social and labour market transformations.⁸⁰

Yet, many doctoral students (in Europe as elsewhere) have little exposure to innovative doctoral training that provides these skills. As such, “Modernizing the PhD could (...) help to solve the bottleneck problem by equipping doctorate holders with soft skills that make them more employable wherever they go”.⁸¹

MSCA aims to achieve this objective primarily through its Innovative Training Networks (ITNs, delivered by single institutions or partnerships of European (and non-European) universities, research institutions, businesses and other socio-economic

⁷⁴ Cyranoski, D., Gilbert, N., Ledford, H., Nayar, A. and Yahia, M. (2011) Education: the PhD factory. *Nature*, 472, pp.276-279.

⁷⁵ De Grande, H., De Bouser, K., Vandeveld, K., Van Rossem, R. (2014) ‘From academia to industry: are doctorate holders ready?’ *Journal of the Knowledge Economy*, vol.5, pp. 538-561.

⁷⁶ Green, B., Maxwell, T. W. and Shanahan, P. J. (eds) *Doctoral education and professional practice: The next generation?* Armidale, NSW, Kardoorair Press.

⁷⁷ In 2013, 37% of Europeans preferred self-employment over other forms of employment – compared to 51% and 56% in the US and China respectively.

⁷⁸ Dance, A. (2013) Graduate students: Structured Study. *Nature*, 493, pp.259-261. Jackson, D. (2013) ‘Completing a PhD by publication: a review of Australian policy and implications for practice’ *Higher Education Research & Development*, 32, pp.355-368.

⁷⁹ Breschi, S., Lenzi, C., Malerba, F. and Mancusi, M. L. (2014) ‘Knowledge intensive entrepreneurship: sectoral patterns in a sample of European high-tech firms’ *Technology Analysis and Strategic Management*, 26(7), pp. 751-764.

⁸⁰ Santos, J. M., Horta, H. and Heitor, M. (2016) ‘Too many PhDs? An invalid argument for countries developing their scientific and academic systems: The case of Portugal’ *Technological Forecasting & Social Change*, vol.113, pp.352-362.

⁸¹ Gould, J. (2015) How to build a better PhD. *Nature*. vol. 528, pp. 522-525. Pp.523. An attempt to do this is the BEST (Broadening Experiences in Academic Training) in the US, where 17 institutions are exploring ways of improving biomedical career development and better prepare PhD candidates and postdocs for a range of career options, funded by the National Institutes of Health Common Fund. For more information see <http://www.nihbest.org/about-best/>

actors) and the doctoral programmes in COFUND. From FP7 to H2020 greater emphasis was given to the implementation and adoption of the European Charter & Code for researchers as well as the Principles for Innovative Doctoral Training -as evidenced by the introduction of the Industrial Doctorates scheme. As reported in the interim evaluation of the FP7 MSCA, these changes reinforced the role of industry in doctoral training by aiming to combine scientific excellence and business innovation.⁸²

ITNs under H2020 include European Training Networks (ETN), European Industrial Doctorates (EID) and European Joint Doctorates (EJD). ITNs, thus, are expected to be innovative, through the inclusion of substantial elements of knowledge transfer, or joint supervision across institutions. They emphasise the development of knowledge and skills around creativity, entrepreneurship, team-work, risk-taking, project management, communication and societal outreach, IPR and ethics. Interviewees for the evaluation underlined the importance of the broad range of management skills acquired through ITNs, which enable career progression and the articulation of ambitious research programmes:

- "When they finish their fellowships, researchers are much better equipped and capable to set up their own team and build a network around themselves." (National policy-maker and programming officer and national contact point)
- "The MSCA fellows also learn about some abilities an "ordinary" scientist usually doesn't learn. This goes from project management to patent law and registration to intellectual property issues." (National policy maker and programming officer).

It should be noted that while the provision of complementary skills is relevant in the EU context, it is important to retain the programme's main focus on scientific excellence in order to achieve its objectives. The objective is that the complementary skills training enhance, rather than detracts from, the traditional doctorate.⁸³

2.1.3 SO.2: Nurturing excellence by means of cross-border and cross-sector mobility

2.1.3.1 Cross-border mobility

The OECD has reported that: "the research impact of scientists who move affiliations across national boundaries is nearly 20% higher than that of those who never move abroad".⁸⁴ International co-publications tend to be more often cited⁸⁵. OECD data also suggest that "with few exceptions, individuals not changing affiliations (stayers) are more likely to publish in journals of lower "prestige".⁸⁶ This is graphically illustrated below.

⁸² PPMI (2013) FP Marie Curie Actions Interim Evaluation: Final Report. PPMI. <http://ec.europa.eu/smart-regulation/evaluation/search/download.do;jsessionid=KhNZTSFMF3Qr0JTmjzGgCvMnbPnY0Xm2RSmTyyHMx61pZLqCvT!1601440011?documentId=6706717>

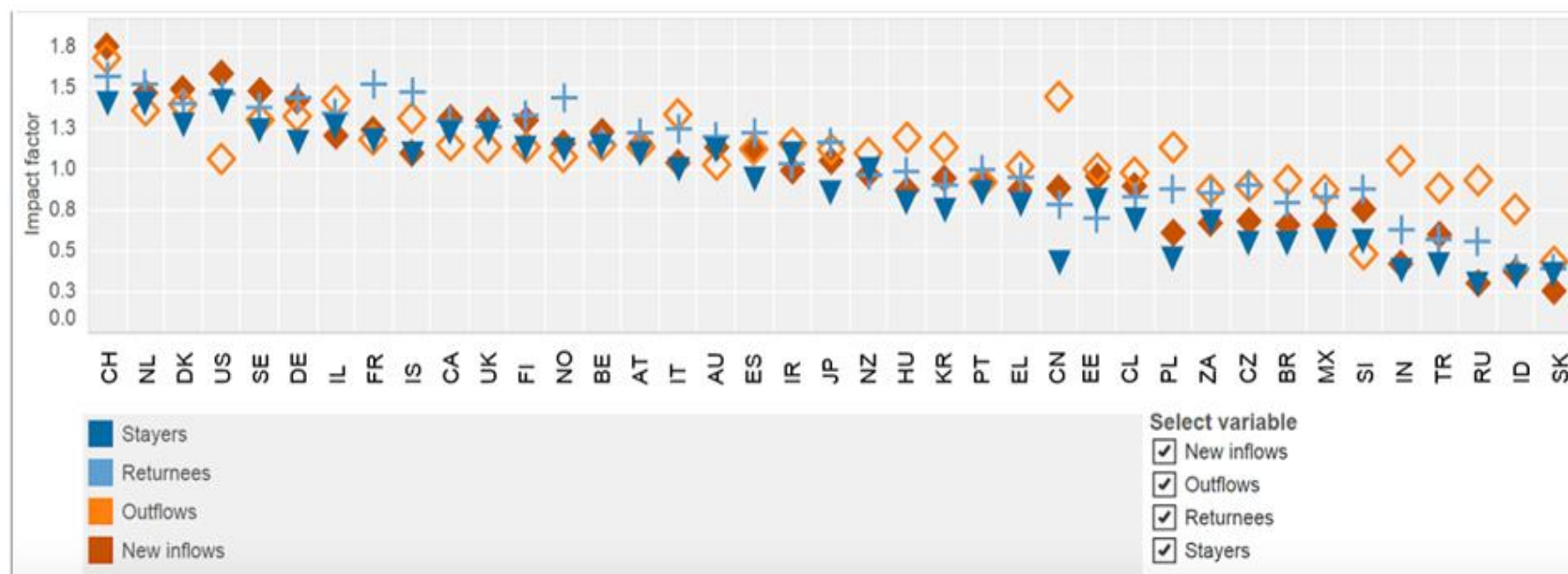
⁸³ Dance, A. (2013) Graduate students: Structured Study. *Nature*, 493, pp.259-261.

⁸⁴ OECD (2013) Science, Technology and Industry Scoreboard 2013. Innovation for Growth. <http://www.oecd.org/sti/scoreboard-2013.pdf> p.15.

⁸⁵ European Commission (2016) 'Performance analysis of international participation in Horizon 2020. A support study for the interim evaluation of H2020' European Commission, October 2016.

⁸⁶ OECD (2015) 'Science, Technology and Industry Scoreboard 2015'. OECD, Paris. P.128.

Figure 11. Impact of scientific authors, by mobility profile



Source: OECD based on Scopus Custom Data, Elsevier, on the Scopus journal title list (May 2015). Only authors with two or more publications are considered.⁸⁷

⁸⁷ "The indicator is represented as the median Scimago Journal Rank (SJR) 2013 among authors in the relevant category and economy. A mobility episode is identified in 2013 when an author who is affiliated to an institution in a given economy in his/her last publication in 2013 was previously affiliated to an institution in another economy. Authors are classified as Stayers if the main affiliation for both 2013 and pre-2013 correspond to the reference economy. The returnee status if they moved affiliation into the reference economy, but were affiliated to it in his/her first recorded publication. From the perspective of the previous economy of author affiliation, individuals can be computed as outflows". For further details see <http://www.oecd.org/sti/inno/scientometrics.htm>

In Europe researchers with international experience tend to exhibit a higher scientific impact.⁸⁸

Mobility is also a key tool to develop international cooperation, which strengthens the EU's research excellence and attractiveness by providing access to new resources, and can provide access to research test beds and innovative advances in areas where European countries are less specialised.⁸⁹

Yet, the MORE2 survey suggested that around a third of "post-PhD researchers in the EU-27 have worked abroad (EU or worldwide) as researchers for more than three months at least once during the last ten years. (...) Another 17% have been >3 month mobility but over 10 years ago. This means that around 48% of the researcher population has been mobile at least once in their career following their PhD".⁹⁰ Almost 140 nationalities have received MSCA funding since 2014. Around one in four MSCA fellows are researchers attracted to Europe from countries outside the EU Member States or the Horizon 2020 Associated Countries.

There are imbalances in the mobility of European researchers, with low levels of mobility to emerging countries such as Brazil, China and India. These emerging destinations are amongst those who have made the greatest rate of progress in scientific production in the last years and are now leaders in investment in some areas, including large private sector R&D investments. As an example, China's Huawei's R&D investment in 2014 was higher than that of Apple, Oracle or Facebook.⁹¹ Given the strategic importance of these countries, Global Fellowships could consider ways to make mobility to emerging destinations more attractive, without compromising the programme's emphasis on excellence. Researchers tend to be less knowledgeable about those destinations and in light of greater uncertainty researchers may be less willing to commit to long mobility periods in those countries. Participation of emerging destinations in RISE and ITN projects could also be further promoted, as this would enable European-based research staff, including PhD candidates, to spend short periods of up to one year in these countries.

2.1.3.2 Cross-sector mobility

Circulation and transfer of knowledge across sectors facilitates the production of research with societal or economic value. A growing share of PhD candidates in the EU is finding career opportunities outside academia.⁹² Yet, the proportion of all researchers in the EU working in the private sector in 2014⁹³ (48%) was well below

⁸⁸ Science Europe and Elsevier (2013) Comparative Benchmarking of European and US Research Collaboration and Researcher Mobility. A report prepared in collaboration between Science Europe and Elsevier's SciVal Analytics September 2013.

⁸⁹ European Commission (2016) 'Performance analysis of international participation in Horizon 2020. A support study for the interim evaluation of H2020' European Commission, October 2016.

⁹⁰ IDEA Consult (2013) MORE2 "Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. Deliverable 5: Higher Education Sector Report (Indicator Report)" https://cdn2.euraxess.org/sites/default/files/policy_library/report_on_survey_of_researchers_in_eu_hei.pdf p.11

⁹¹ <https://qz.com/374039/huaweis-rd-spend-is-massive-even-by-the-standards-of-american-tech-giants/>

⁹² Era (n.d.) "Using the Principles for Innovative Doctoral Training as a Tool for Guiding Reforms of Doctoral Education in Europe", Report of the ERA Steering Group Human Resources and Mobility (ERA SGHRM) https://cdn4.euraxess.org/sites/default/files/policy_library/sghrm_idtp_report_final.pdf

⁹³ Ibid.

the levels of US, Japan, Korea, Canada or China. While differences have decreased with the US and Japan over the last decade in this respect, they remain substantial⁹⁴.

A recent European Commission report⁹⁵ highlighted the positive correlation between the level of science-business collaboration and the quality of research and frequency of innovation. Yet, collaboration between sectors is also comparatively low in Europe. Public-private co-publications per million-population stand substantially below those in Korea, the US or Japan.⁹⁶

The main barriers to cross-sectoral mobility in Europe include researchers' lack of the right skills to cooperate with industry -such as people management, intellectual property rights and entrepreneurship, which are often absent from training programmes for researchers in higher education⁹⁷, and industry not being prepared to integrate doctoral candidates appropriately. MSCA works in these areas through ITNs, IFs, COFUND and RISE. Over the course of H2020 it is expected that 65,000 researchers experience international mobility funded by MSCA, and that "for just under half of them, this will also include mobility or exposure to the non-academic sector or vice-versa".⁹⁸ In 2016 a new pilot Society and Enterprise Panel for experienced researchers within the IF was launched. This reflects efforts to better meet the needs of the non-academic sector. A recent Commission communication campaign addressed specifically at businesses has been associated with an increase in the number of applications from business in H2020, although "a number of business still lack information about certain specific aspects of the MSCA", including its existence, relevance and potential benefits to them.⁹⁹

In the H2020 Decision there is mention, under this objective, of the importance of mobility between disciplines.¹⁰⁰ This aspect is increasing its relevance, as highlighted during stakeholder interviews, because complex social and technical problems increasingly require collaboration between different disciplines for their solution. At the individual level, interdisciplinary knowledge is seen to enhance employability.¹⁰¹ Around 30% of MSCA-IF proposals so far are deemed to have included interdisciplinary research. ITNs specifically emphasise the need for interdisciplinary/

⁹⁴ See http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_persocc&lang=en

⁹⁵ European Commission (2016) Science, Research and Innovation Performance of the EU, 2016. Luxembourg, Office for Official Publications of the European Union.

⁹⁶ European Commission (2016) Science, Research and Innovation Performance of the EU, 2016. Luxembourg, Office for Official Publications of the European Union. Hollanders, H., Es-Sadki, N. and Kanerva, M. (2016) European Innovation Scorecard 2016. Belgium, European Union. http://www.knowledgetransferireland.com/About_KTI/Reports-Publications/European-Innovation-Scoreboard-2016.pdf

⁹⁷ IDEA Consult (2013) MORE2 "Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. Deliverable 5: Higher Education Sector Report (Indicator Report)" https://cdn2.euraxess.org/sites/default/files/policy_library/report_on_survey_of_researchers_in_eu_hei.pdf

⁹⁸ European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.176.

⁹⁹ PPMI, AIT and Optimity (2017) Study of business participation and entrepreneurship in MSCA actions (FP7 and Horizon 2020). Final report to DG Education, Youth, Sports and Culture. P.120.

¹⁰⁰ By interdisciplinary mobility we refer to the mobility of a person between disciplines, or engagement in projects that integrate various disciplines into one research project.

¹⁰¹ Dance, A. (2017) Combine and Conquer. *Nature*, 545, pp.515-517.

complementary research programmes, underpinned by corresponding training modules. COFUND is often interdisciplinary.¹⁰²

2.1.4 SO.3: Stimulating innovation by means of cross-fertilisation of knowledge

The latest European Innovation Scoreboard (EIS) shows that Europe is lagging behind main international competitors, such as the US, Canada and Australia, in terms of innovation.¹⁰³ Europe's patenting performance is comparatively weak, and Europe lags behind in the development of new products, new processes and new services.

Cross-fertilisation of knowledge is a key factor in the generation of innovation and in moving from discovery to market application. There is little data on international competitors' proportion of innovative firms collaborating with HEIs or research institutes. Available data suffers from some comparability problems due to differences in innovation survey methodologies¹⁰⁴, but suggests that European leaders in this area are high performers compared to countries such as Japan or Korea. Yet, there is much variation within Europe, and also by company size.¹⁰⁵ The H2020 Decision notes that cross-fertilisation and sharing of knowledge from research to market (and vice-versa) is sought in MSCA through the mobility of highly skilled research and innovation staff between sectors, countries and disciplines. Commercial and innovation outcomes were given a more prominent role in H2020 compared to FP7.

Some stakeholders reported that RISE is relevant because it enables the organisation of travel/ meetings/ networking activities within a single project, gaining momentum and concentrating effort instead of having to submit separate proposals for all these activities.

- "We saw some examples where RISE was used by small SMEs and larger companies to test ideas in collaboration with universities. It allows them to work with new researchers." Interviewee (Policy-maker and programme officer).

RISE provides a critical mass, with almost 23 000 planned secondments with staff exchanges to or from non-academia and to or from third countries in the first three years of H2020. A number of stakeholders (policy-makers), however, reported to view the RISE action as being related primarily to the building of long-term relationships, rather than excellent science.

As already noted, with a view to boosting the participation of the non-academic sector in the Individual Fellowships, a new pilot Society and Enterprise Panel for experienced researchers was launched in 2016. The objective of this panel was to support researchers seeking to work on research and innovation projects in an organisation from the non-academic sector.

Cross-fertilisation can also occur between countries and disciplines, as noted in the H2020 Decision. The proportion of international co-inventions (inventions that feature at least one foreign co-inventor in patents invented domestically) increased in all economic sectors in the decade 2003 to 2013¹⁰⁶. The overall level of international co-

¹⁰² Avramov, D. (2015) 'FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): rationale, implementation and achievements' Final Revision 13 August 2015.

¹⁰³ Hollanders, H., Es-Sadki, N. and Kanerva, M. (2016) European Innovation Scorecard 2016. Belgium, European Union. http://www.knowledgetransferireland.com/About_KTI/Reports-Publications/European-Innovation-Scoreboard-2016.pdf

¹⁰⁴ OECD (2015) 'Science, Technology and Industry Scoreboard 2015'. OECD, Paris.

¹⁰⁵ See <http://www.oecd.org/innovation/inno-stats.htm>

¹⁰⁶ OECD (2015) 'Science, Technology and Industry Scoreboard 2015'. OECD, Paris.

inventions in some sectors, such as organic chemistry, pharmaceuticals and food chemistry now exceeds 15%.

2.1.5 SO. 4: Increasing structural impact by co-funding activities

There is less quantitative data on the need for co-funding activities than in relation to the other objectives of MSCA. There is, however, a clear rationale for the establishment of mechanisms that enable European stakeholders to pool resources and combat fragmentation in terms of objectives and actions. There is also a clear rationale to spread the best practices generated by MSCA to various decision-making levels.

MSCA, through COFUND, stimulates regional, national and international programmes to foster excellence in research and spreads the best-practices of MSCA –for example in terms of the improvement of employment conditions for researchers. COFUND under H2020 aims to “increase the transnational, inter-sectoral and inter-disciplinary mobility of researchers, in line with the principles set out in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, and with the EU Principles for Innovative Doctoral Training¹⁰⁷ (when appropriate)”.¹⁰⁸ It co-funds both doctoral training and fellowship programmes for experienced researchers.

2.1.6 Raise awareness of the importance of the research career

MSCA aims to raise awareness of researchers’ work amongst the general public (in particular young people), and help change public perception of science, in order to enhance the recognition of research and innovation activities and the attractiveness of research careers. While all MSCA projects include dissemination activities, the European Researchers' Night through its funded projects around Europe and beyond specifically addresses these aims of the programme.

From 2005 to 2013, the number of researchers increased in the EU. The number of doctoral candidates stood at around 738 000 in the EU-28 in 2014¹⁰⁹; the EU, however, is still far from achieving its targets for investment in R&D.¹¹⁰ The majority of European countries have a lower share of doctorate holders than international competitors such as the US, Australia or Canada, even though the number of new doctorate graduates per 1 000 of the population aged 25-34 is higher in the EU-28 than in the majority of its international competitors.¹¹¹

Recently, concerns have been raised that advanced industrialised countries are training too many PhDs compared to the number of academic jobs and industrial sector jobs that require doctorates.¹¹² Whilst this may hold for mature scientific systems (such as the US), the argument has been questioned in relation to countries that are developing their scientific systems, as is the case of many EU countries.

¹⁰⁷ See <https://euraxess.ec.europa.eu/belgium/jobs-funding/doctoral-training-principles>

¹⁰⁸ http://ec.europa.eu/research/participants/portal/doc/call/h2020/msca-cofund-2016/1727615-h2020-msca-cofund-2016_guide_for_applicants_2016_2_en.pdf p.6.

¹⁰⁹ http://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_personnel

¹¹⁰ See Eurostat (2016) Europe 2020 Indicators –research and development http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_research_and_development

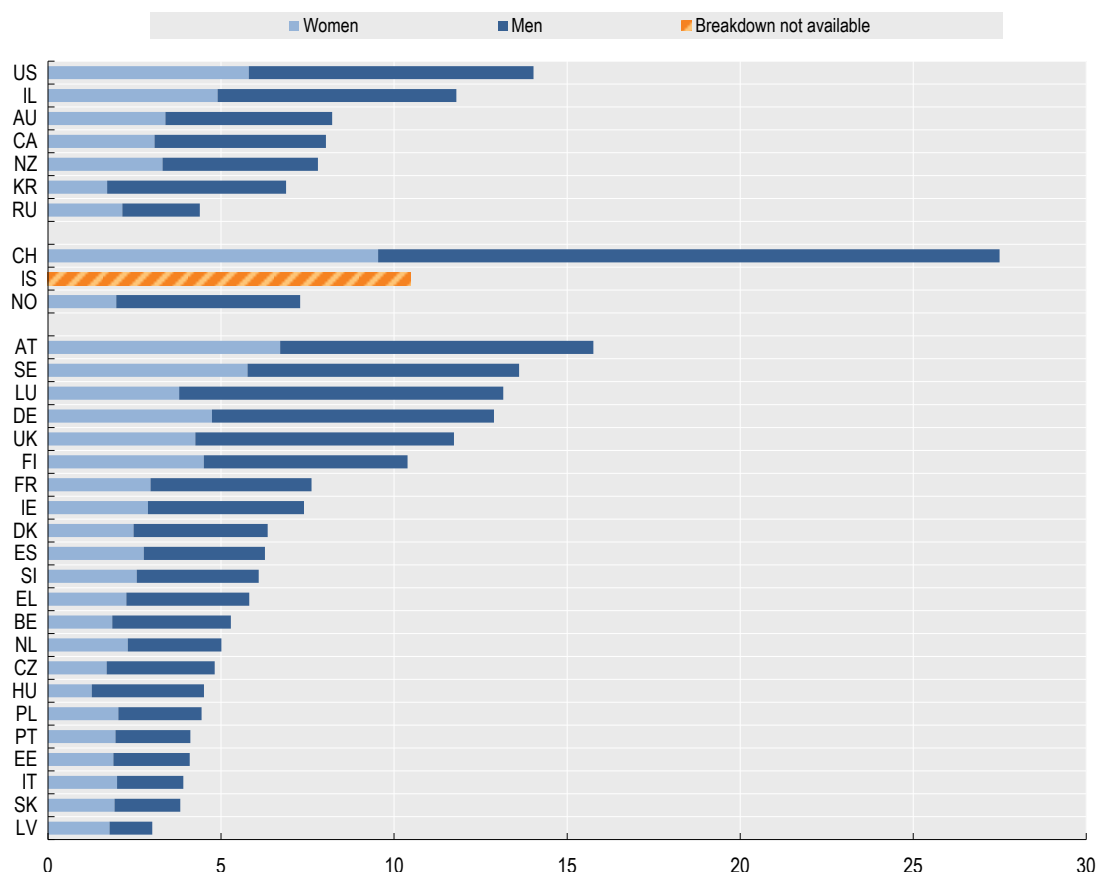
¹¹¹ European Commission (2016) European Innovation Scorecard. European Union, Belgium.

¹¹² Cyranoski, D., Gilbert, N., Ledford, H., Nayar, A. and Yahia, M. (2011) Education: the PhD factory. *Nature*, 472, pp.276-279. Powell, K. (2015) The future of the post-doc. *Nature*, 520, pp. 144-147.

These have been found to suffer from a shortage, rather than surplus, of doctorate holders, which is likely to be exacerbated in the next few decades.¹¹³

There is a gap in public awareness of the MSCA and more generally in understanding of the benefits of publicly-funded (excellent) research. In this context, it is relevant to raise awareness of the importance of research careers. The European Researchers' NIGHT and the outreach activities undertaken by the fellows under the various MSCA schemes aim to fill that gap.

Figure 12. Doctorate holders[^] in the working age population (2012) –per thousand population aged 25-64



Source: OECD calculations <http://dx.doi.org/10.1787/888933273598>, June 2015. [^] residents of a country that have completed the second stage of tertiary education (ISCED97-Level 6), leading to an advanced research qualification.

2.2 Cross-cutting issues

MSCA aims to contribute to the achievement of a wide range of H2020 cross-cutting issues. This evaluation assesses the contribution of MSCA to H2020 cross-cutting issues in its analysis of programme effectiveness. Explicit linkages between the Specific Objectives of H2020 and a range of H2020 cross-cutting issues are reviewed in the Coherence section of the evaluation.

¹¹³ Santos, J. M., Horta, H. and Heitor, M. (2016) 'Too many PhDs? An invalid argument for countries developing their scientific and academic systems: The case of Portugal' *Technological Forecasting & Social Change*, vol.113, pp.352-362.

2.3 Relevance of programme objectives for specific stakeholders

The programme aims to address the needs of a range of stakeholders in particular those of individual researchers, organisations (higher education institutions, research institutions, businesses, NGOs) and Member States.

2.3.1 Researchers

2.3.1.1 General overview

Interview data collected for this evaluation conveyed a clear message that MSCA objectives and actions are considered highly relevant by researchers.¹¹⁴ The relevance of MSCA is based on its capacity to address skills development, enhancing employability and the international visibility of researchers and participating institutions (both education and non-education organisations) –for additional benefits of MSCA see Section 4 of this report:

“MSCA is an excellent programme that should continue beyond the ages. It is a relevant instrument to address the real needs for research in the EU. (...) When we think about competitiveness with other world regions and about developing research in Europe, all of this starts with people. Hence, the exposure to an international environment through the MSCA is precious”. –National policy-maker and programme officer.

The evaluation survey of researchers gathered data on the extent to which individual researchers considered the development of different types of skills (research skills, complementary skills) and mobility (geographical, cross-sectoral, interdisciplinary) a motivation to participate in the programme. This provides an indication of the relevance of these aspects (related to objective 1 and objectives 2 and 3 of the programme) for participants.

Survey results suggest, first, that skills development was an important motivator for participation in the programme. This is particularly the case for research skills (84% of participants reported these as being of great importance or very great importance for their participation, compared to 68% for complementary skills). It is thus important to maintain a balance between research and complementary skills, given these results, and the concerns that some stakeholders expressed about trends transform doctoral training into skills training –which they feared could be detrimental to the excellence of doctoral training.¹¹⁵ However, this does not appear to have been the case during the period evaluated.

On the whole, skills development aspects are relevant for all sub-groups of participants: rates above 50% of respondents in all cases reported that access to training in research or complementary skills had been of great importance or very great importance as a motive for their application. The main differences refer to participants in ITNs and Early Stage Researchers (ESR) providing greater emphasis to skills development, as could be expected. Management and technical staff place less emphasis on skills development than other groups. As an extension of this COFUND and IF participants show comparatively lower emphasis on skills development whereas ITNs show higher emphasis.

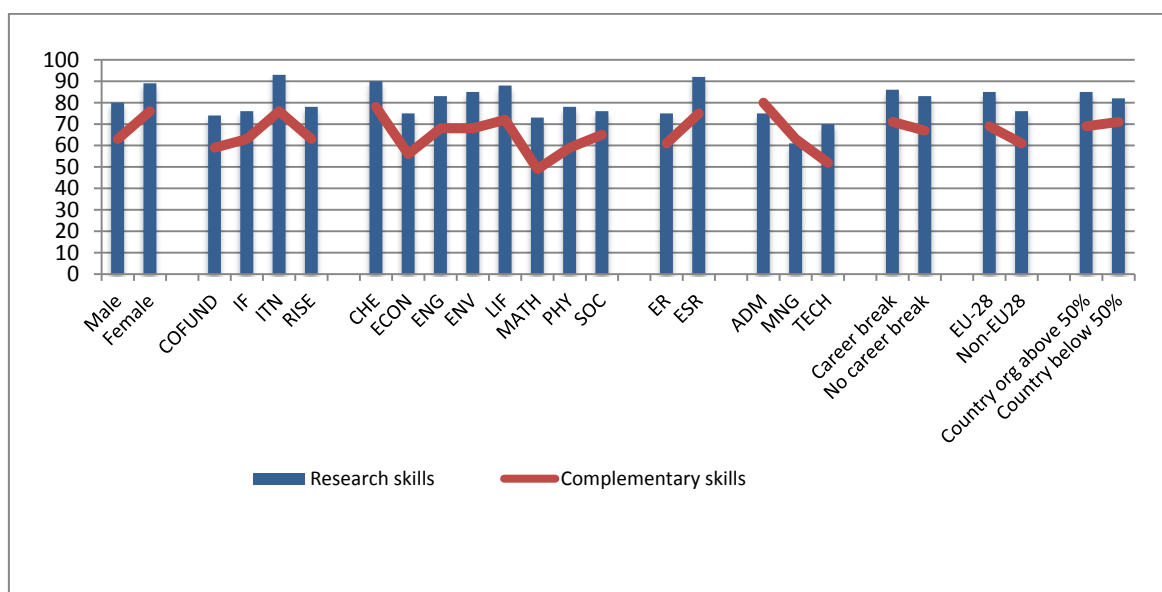
¹¹⁴ PPMI (2013) ‘FP7 Marie Curie Actions Interim Evaluation’ Final report. See also, for example, Coimbra Group position paper on H2020 <https://www.coimbra-group.eu/uploads/2013/Coimbra%20Group%20position%20on%20Horizon%202020-Final-22Feb2013.pdf>; LERU (2016): LERU's interim evaluation Horizon 2020. LERU Advice Paper no.21. http://www.leru.org/files/publications/LERUs_interim_evaluation_of_Horizon_2020_final.pdf

¹¹⁵ See also ICF (2017) European Industrial Doctorates: towards increased employability and innovation. <https://bookshop.europa.eu/en/european-industrial-doctorates-pbNC0215932/>.

In more applied technical fields (Chemistry, Life Sciences, Environmental and Engineering-related subjects) skills development is particularly important as a motivation. It is much less important for those in Economics, Maths –particularly in the case of complementary skills. Greater awareness-raising actions on the importance of skills –particularly complementary skills, to obtain jobs outside academia- may be warranted in those fields.

Differences by country group are modest. Participants with host organisations in EU-28 countries place more emphasis on skills development than those based outside the EU. Above the median research excellence intensity in the country of the host organisation (EU-28 countries) was associated with a slight increase in the importance of research skills, but a decrease in the importance of complementary skills.

Figure 13. Importance of research and complementary skills for participation in MSCA



Source: ICF survey of MSCA fellows. Percentage of respondents stating that access to training to develop research or complementary were motives "of great importance" or "very great importance" for them to submit an MSCA application¹¹⁶.

Key: ER= Experienced researcher. ESR: Early stage researcher. ADM= Administrative staff supporting R&I activities of the project; MNG: Managerial staff supporting R&I activities of the project; TECH: Technical staff supporting the research and innovation activities of the project. CHE= Chemistry, ECON= Economic Sciences, ENG= Information Sciences and Engineering, ENV= Environmental and Geo-Sciences, LIF= Life Sciences, MATH= Mathematics, PHY= Physics, SOC= Social and human sciences. Country= country of host organisation (main location of fellowship) –country above/ below are countries above/below the median EU-28 in terms of scientific publications amongst the top 10% most cited publications worldwide as % of total scientific publications of the country; Career break= voluntary or involuntary career break of more than 3 months in the last 10 years due to caring responsibility, illness, childcare or unemployment

Various stakeholders interviewed also underlined the importance of skills development as part of the programme:

- "The most important aspect of the programme is skills development. The programme aims to contribute to the development of researchers' skills and

¹¹⁶ The percentages excludes respondents who stated that the question was not applicable to them

support their careers through the prestige of the MSCA fellowships. The programme also helps to build capacity within teams and institutions through the mobility of researchers, fostering the internationalisation of teams and research in Europe” –National policy-maker and programme officer.

MSCA stimulates geographical, interdisciplinary and cross-sectoral mobility. The relevance of these different types of mobility for participants varied. Geographical mobility was a strong driver for participation. Its importance was only slightly lower than the importance of skills development. This is aligned with the significant benefits of mobility highlighted in the needs analysis. The importance of interdisciplinary mobility was lower and that of cross-sectoral mobility was much lower.

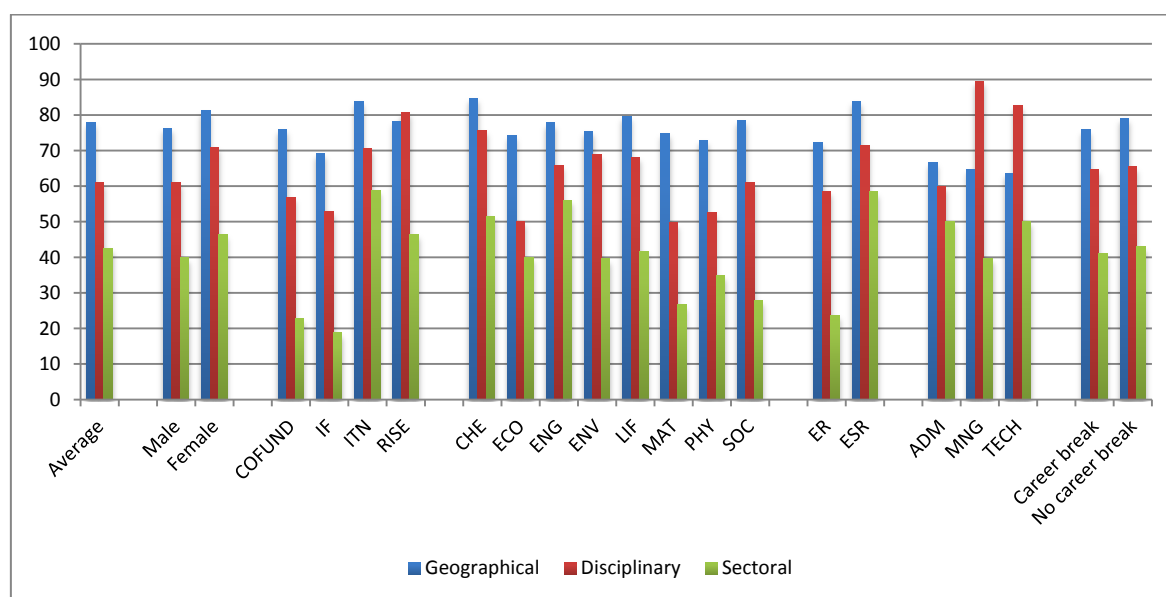
Female researchers were generally more motivated to undertake all types of mobility. ESR ranked higher than ERs in terms of all types of mobility, but particularly in terms of cross-sectoral mobility.

Those academic subjects where the development of complementary skills was reported as most important were also those more prone to underline the importance of cross-sectoral mobility.

ITN participants ranked high on the three types of mobility. Interdisciplinary mobility was particularly high for RISE participants. IF and COFUND ranked lower in terms of the relevance of mobility in general, and particularly low in terms of cross-sectoral mobility. Management and technical staff reported a particularly high degree of importance of interdisciplinary mobility.

As in the case of skills development, career break episodes do not make a difference.

Figure 14. Importance of different types of mobility for participation in MSCA



Source: ICF survey of MSCA fellows. Percentage of respondent stating that each type of mobility was a motive "of great importance" or "very great importance" for them to submit an MSCA application¹¹⁷.

Key: See previous figure. Interdisciplinary mobility refers to the motivation to work with researchers from other disciplines. Cross-sectoral mobility is the average of the importance of (a) enhancing chances of a career outside academia and (b) work with researchers from the

¹¹⁷ The percentages excludes respondents who stated that the question was not applicable to them.

non-academic sector. Variation on these two indicators was generally very low so they are reported together.

The above analysis suggests that all the types of mobility that the programme aims to support are relevant for researchers, except in the case of sectoral mobility for ER. Sectoral mobility is particularly relevant to ESR/ ITNs. This is logical since ESR may be considering careers in academia and industry, whereas most ER will be established academics.

2.3.1.2 Diversity considerations

Some stakeholders reported that there is less support for senior researchers than for early career researchers in the programme. While they can coordinate ITN and RISE projects, candidates over 45 for IF tend to be less successful, as IF require a supervisor and training elements, so its design is more relevant to younger researchers. ERC grants can be seen to partly address this gap.

MSCA has a strong track record with regards to gender balance. To date, a total of 41% of MSCA-supported researchers are women.¹¹⁸ This is higher than the average percentage of female researchers in Europe.¹¹⁹ MSCA proposals are encouraged to reduce gender-related barriers and implement training on gender issues. MSCA grants under Horizon 2020 so far have also seen a larger share of female coordinators (47%), when compared to the framework programme (33%), although there is a smaller representation of female as supervisors in Individual Fellowships (21%), which reflects the glass ceiling apparent among academic staff and research boards. MSCA has an IF Career Re-start Panel. However, the "Career Restart Panel" is perceived as too short for resuming a career after a break, which is a long process. After a two-year fellowship, beneficiary restarters do not position themselves at the same level as the researchers who have not experienced a career break.¹²⁰

The issue of diversity and inclusion in research goes beyond gender. Specific support could be provided to researchers living with a disability: mobility is often far more difficult and more expensive for them due to special needs when travelling, finding a suitable residence, and working abroad.¹²¹

The MSCA Advisory Group recommended that consideration be given to enhanced flexibility and "blended mobility" in research training (for example, a combination of short, face-to-face and ICT contacts), and this is a proposition that may open up participation in the programme to new researchers. Flexibility, however, should not compromise the quality of the research and of the training provided.

2.3.2 Organisations

MSCA aims to be relevant to the needs of a diverse set of organisations outside of the education sector. During stakeholder interviews, ITN was underlined as particularly relevant –and popular– in some countries, given its role in stimulating international collaboration in training and the high level of skills it provides to future generations of researchers. The popularity of IF is also very high. Some interviewees for the evaluation reported that smaller and less known universities can have difficulties in

¹¹⁸ 44.1% in ITN, 41.7% in IF, 34.2% in RISE and 48.2% in COFUND.

¹¹⁹ Figures for 2015 can be found here:

https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-leaflet-web.pdf

¹²⁰ PPMI, Carsa, Inova (2016) "Research careers in Europe", <http://bookshop.europa.eu/en/research-careers-in-europe-pbNC0614200/> pp.131-132

¹²¹ Text based on internal gap analysis by the European Commission in preparation for the MSCA scoping paper 2018-20.

recruiting MSCA fellows. This, however, could be expected given the focus of the programme on excellence.

On the whole, stakeholder interviews conveyed the view that the programme also meets the needs of private companies. However, some interviewees reported that MSCA is still too complicated for private sector organisations. Difficulties were reported to apply to some SMEs due to lack of awareness and understanding of the programme, or lack of capacity to get involved in it, whereas larger companies are better able to deal with the administration involved in the programme. The level of complexity varies by programme strand. For example, 'Industrial doctorates' is perceived as one of the most relevant and less complicated options for industry participation in some countries.

Stakeholders also reported that sometimes involvement from the private and third sector can be superficial, with organisations being involved only to meet programme requirements, and not being an integral part of the project. Universities used this as a last resort, given that they can find it difficult to attract such organisations to participate in the programme. This suggests that the programme objectives or its delivery mechanisms are not relevant to some types of non-educational organisations, or issues in terms of lack of information, perceived low returns to participation.

2.3.3 EU countries

Data show that in general EU-13 countries tend to submit fewer proposals than EU-15 countries and that the quality of submitted proposals is also lower.¹²² In this regard, the Council Conclusions on Young Researchers, adopted on 29 November 2016¹²³ *"invites the Commission and Member States to foster and adequately reward all types of mobility ... while taking into account the need to close the R&I divide across Member States and regions"*. The Commission is already actively working towards closing the research and innovation divide. In its recent Communication on a renewed EU Agenda for higher education the Commission included a commitment to "Develop opportunities within the Marie Skłodowska-Curie actions that help close the research and innovation divide between Member States and regions and help address brain drain from less developed regions".¹²⁴ Accordingly, some modifications to specific MSCA projects or capacity building in terms of proposal writing to address country divides deserve consideration. However, this objective should not compromise the primary MSCA objective of excellence.

¹²² The number of proposals below threshold amounts to 29% on average among EU-13 compared with 16% on average for EU-15 countries.

¹²³ Council of the European Union (2016) Measures to support early stage researchers, raise the attractiveness of scientific careers and foster investment in human potential in research and development. 14301/16. Brussels, 18 November 2016.

¹²⁴ European Commission (2017) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a renewed EU agenda for higher education. SWD (2017) 164 final. p.9.

3 Efficiency

Efficiency considers the relationship between the resources used by an intervention and the changes that intervention has generated.

3.1 Programme management and use of resources

3.1.1 Efficiency of programme management and use of resources

This section offers a review of available programme and budgetary data provided by European Commission's REA.¹²⁵

Horizon 2020 has a legal objective of spending at most 5% of its operational budget on administration.¹²⁶ The administrative budget committed by REA to H2020 MSCA constitutes only a small proportion of the operational MSCA budget, averaging 2.5% between 2009 and 2015, and therefore continuously below the Horizon 2020 legal objective of 5%. In addition, the proportion of the MSCA budget devoted to management is consistently lower than the management costs for all aspects of the Horizon 2020 framework programme managed by REA (see Figure 15) though the latter is also constantly below the legal objective of 5%.

No data is available for 2007 or 2008 as REA only became operational as of mid-2009. Additionally, data from 2011 will be more representative of programme efficiency, as REA would have initially had to build its capacities and would not have fully managed entire project life cycles. This is also reflected in the sharp increase in H2020 MSCA and FP7 PEOPLE staff, from 73 full time equivalents (FTE) in 2009 to 146 by 2011, and reaching a peak 2013 with 201 FTE. There were 191 FTE employees tasked with MSCA management as of 2015.

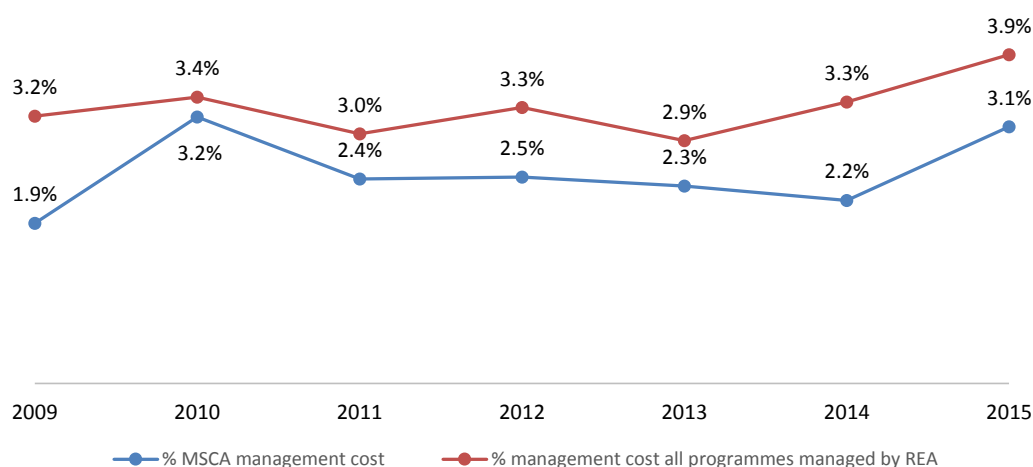
The total actual salary amount paid between 2011 and 2013¹²⁷ – which includes horizontal services (i.e. FP7-Support, Ex-Post audit and Financial Verification) – also increased by 24%. Despite rising wages, the FP7 PEOPLE management cost fell and continued to fall into 2014. This suggests MSCA was efficiently managed and well equipped to deal with cost pressures. A review of financial rules suggests that MSCA use of unit cost contributed to its low administrative overhead.

¹²⁵ Data provided covered the REA Annual Work Programmes, the Annual Activity Reports and the Budget Execution Reports. It should also be noted that REA methodology was modified as of 2014 and details of the administrative budget were not requested anymore by the parent DGs. As a consequence REA also discontinued keeping those details in the internal accounting system.

¹²⁶ As per REA Annual Work Programmes and Horizon 2020 legal basis.

¹²⁷ 2013 is the latest available salary data

Figure 15. Management cost percentage for all programmes managed by REA and MSCA

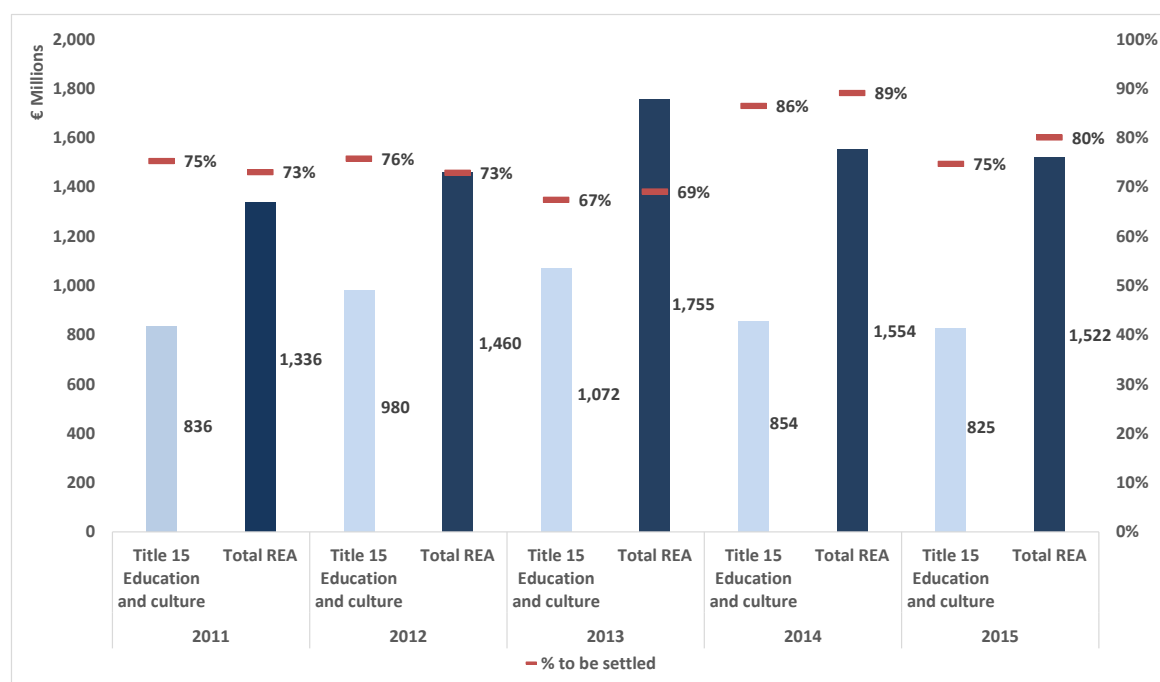


Source: REA, ICF analysis

The operational commitment and payment appropriations from for the (non-differentiated) administrative appropriations were largely fulfilled between 2011 and 2015, with some variation, most notably in 2013 where 97.5% of payments were fully executed.

The proportion of budgetary commitment to actual payment for Title 15 Education and Culture (under which the MSCA programme is subsumed) was broadly similar to the overall budget managed by REA. For instance, the average calendar year budget to be settled for all REA-managed activities between 2011 and 2015 was 77%, slightly higher than the 76% average for Title 15. However, from 2013 onwards an increasing convergence is observed, with more of the Title 15 budget to be settled compared to all REA activities (see Figure 16 below).

Figure 16. Proportion of Commitments To Be Settled



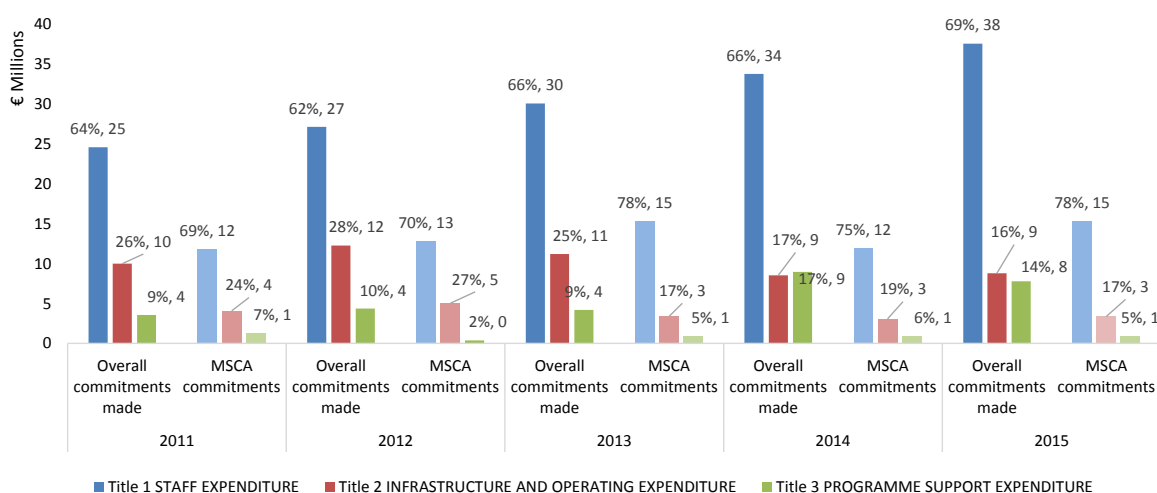
Source: REA, ICF analysis

This suggests that MSCA payment discipline was less affected by the change from FP7 to Horizon 2020 when compared to all activities managed by REA.

The figure below provides an overview of the administrative budget and resource categories managed by the REA as well as those specific to Horizon 2020 Excellent Science (and predecessor actions). Presented per budget title, the indicative budget has increased year on year (with the exception of 2014) both overall and with respect to the Excellent Science and predecessor actions. In proportionate terms, REA overall committed more MSCA resources to staff expenditure (on average 12% higher compared overall REA management expenditure) and 7% less (compared to the overall average) to programme support expenditure.

This suggests that, due to MSCA projects generally being smaller than projects in other parts of Horizon 2020 and the programme funding a larger number of projects, staff requirements are larger for MSCA than for other parts of Horizon 2020.¹²⁸ This pattern is stable over time.

Figure 17. MSCA and overall REA administrative expenditure by category



Source: REA, ICF analysis

REA's annual work programmes mandate a target of executing 100% of the annualised operational budget, as well as a 100% execution of operational payment appropriations as key indicators with regards to an efficient management of resources.

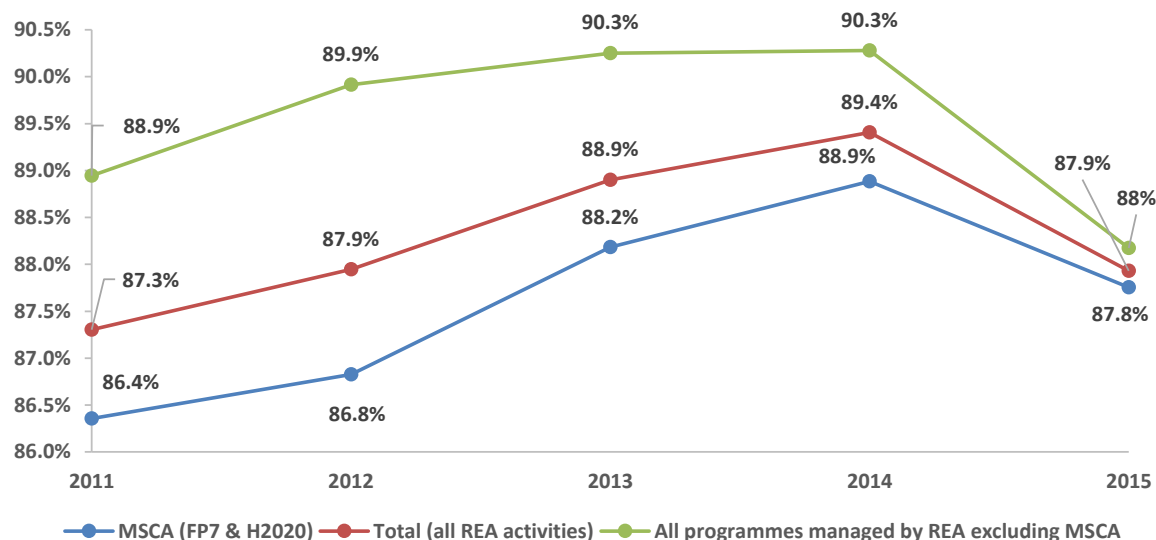
As regards the payments covered by REA's KPI, the target of 100% execution has consistently been met since 2009. When looking at all payment commitments made, the proportion of payments within time varied moderately between 2011 and 2015. A small decline can be seen in 2015, after the change from FP7 to Horizon 2020.¹²⁹

This suggests that over time, REA's operational planning and efficiency with respect to payments has improved, but not consistently and is susceptible to slight disruptions e.g. by change of administrative and financial rules or the overall legal framework.

¹²⁸ This is despite REA staff assigned to MSCA managing on average 32 projects per FTE, significantly higher than the amount of average number of projects managed by staff assigned to other actions of Horizon 2020 (23).

¹²⁹ These proportions will generally be subject to dates and timings of appropriations made (e.g. when payments are authorised. In a reporting year where a large number of payments are authorised towards the cutoff for the Annual Activity Report, the proportion of payments executed still within the reporting period will naturally be lower.

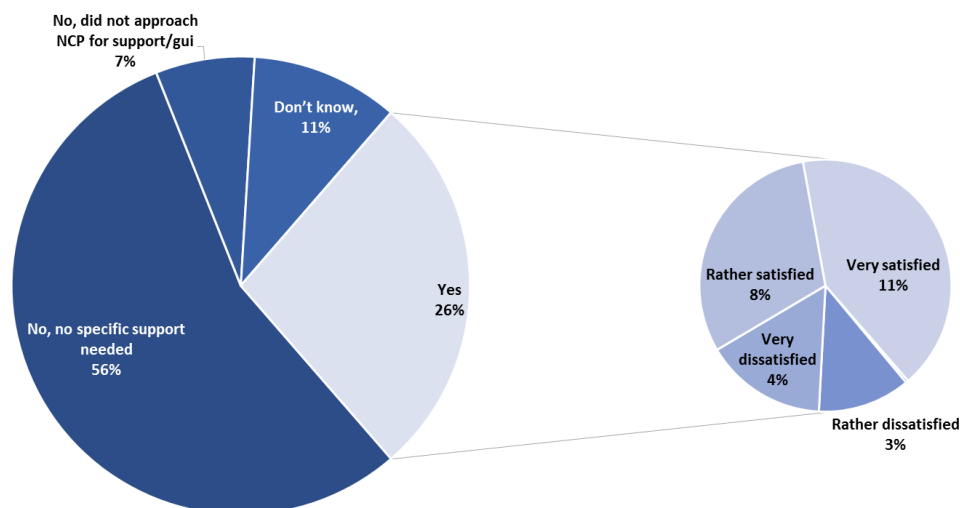
Figure 18. Outturn to payment appropriations – programmes managed by the REA



Source: REA Annual Activity reports, includes all payment commitments made.

As regards support services available at the national level, it is worthwhile investigating satisfaction with National Contact Points (NCP). IF, ITN, COFUND organisations were asked whether or not they had sought support or guidance from their National Contact Point (NCP) during the application phase. Almost two thirds of respondents (63%) stated that their organisation either did not approach their NCP or had no specific support requirements.

Figure 19. Use and satisfaction with National Contact Point for support or guidance during the application phase



Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 96/97: Have you approached a National Contact Point for support or guidance during the application phase? & How satisfied were you with the support or guidance you received from the National Contact Point? 2 133 responded to question 96 and 581 to question 97. Question 97 routed all those answering "Yes" to question 96.

A further 11% were unaware of any NCP support provision. A quarter (26%) of organisations did access support from their NCP, of which roughly three quarters were happy with the support quality and roughly a quarter were not.

This suggests that there is still room for improving and promoting the service offered by the NCP, in particular to improve accessibility of the programme to newcomers and applicants which cannot rely on expert support within their organisation.

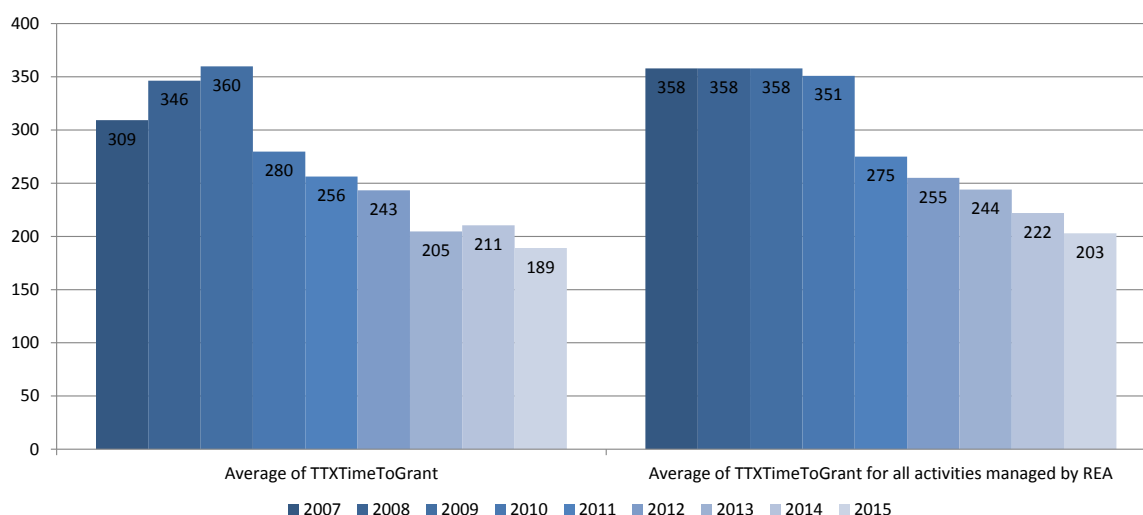
3.1.2 Time-to-grant

One of the main objectives in terms of programme efficiency from FP7 to Horizon 2020 was to reduce time-to-grant, i.e. the delay between submitting a proposal and signing the grant agreement.

As Figure 20 shows, the average time-to-grant for MSCA projects, if aggregated by year of call deadline, reduced significantly since 2009.

So far, the MSCA projects in H2020 have succeeded in reducing time-to-grant on average successively, and when compared to average time-to-grant for MSCA projects in FP7. This is in line with the overall trend of decreasing time-to-grant across all activities managed by REA.

Figure 20. Average time to grant by year of call deadline, FP7 to Horizon 2020, MSCA and other activities managed by REA

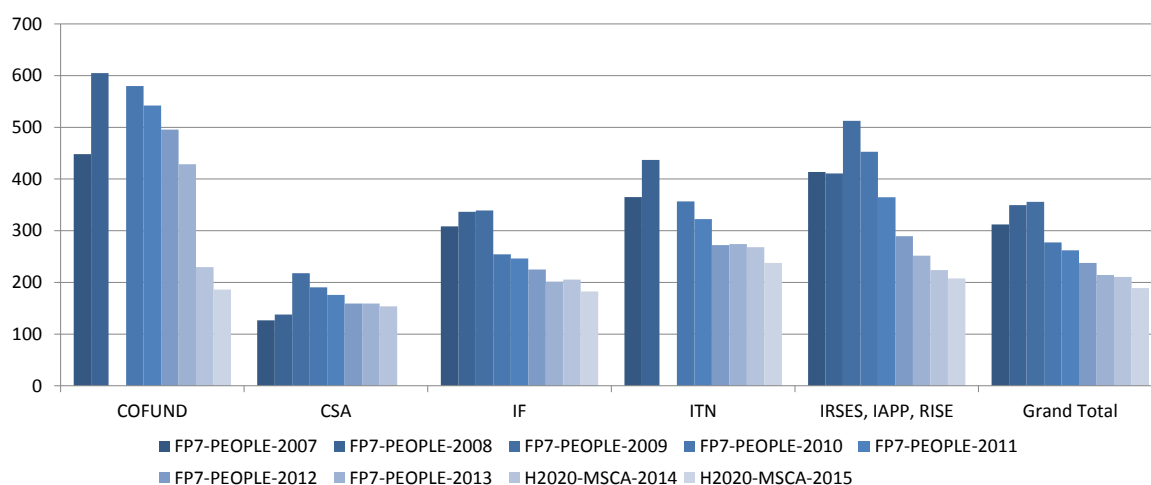


Source: ICF CORDA analysis, REA Annual Activity Reports. Disaggregated REA figures for 2007-2009 not available.

The figure below shows the latest available average time-to-grant breakdown for projects under MSCA. The data illustrates falling average time-to-grant days between 2007 and 2015 for each of the actions. The largest, proportionate reduction in the average number of days was with respect to COFUND grants (62% fall), followed by IRSES (50% reduction). European Researchers' Nights grants increased their average time-to-grant slightly between 2007 and 2015, by 21%.

There is no breakdown available for the MSCA time-to-grant for 2016, however the last Annual Work Programme reports 97% of grants are executed on average within 203 days.

Figure 21. Average time to grant in MSCA by action, FP7 and Horizon 2020 to date, by call year



Source: ICF CORDA analysis

3.1.3 Time to payment

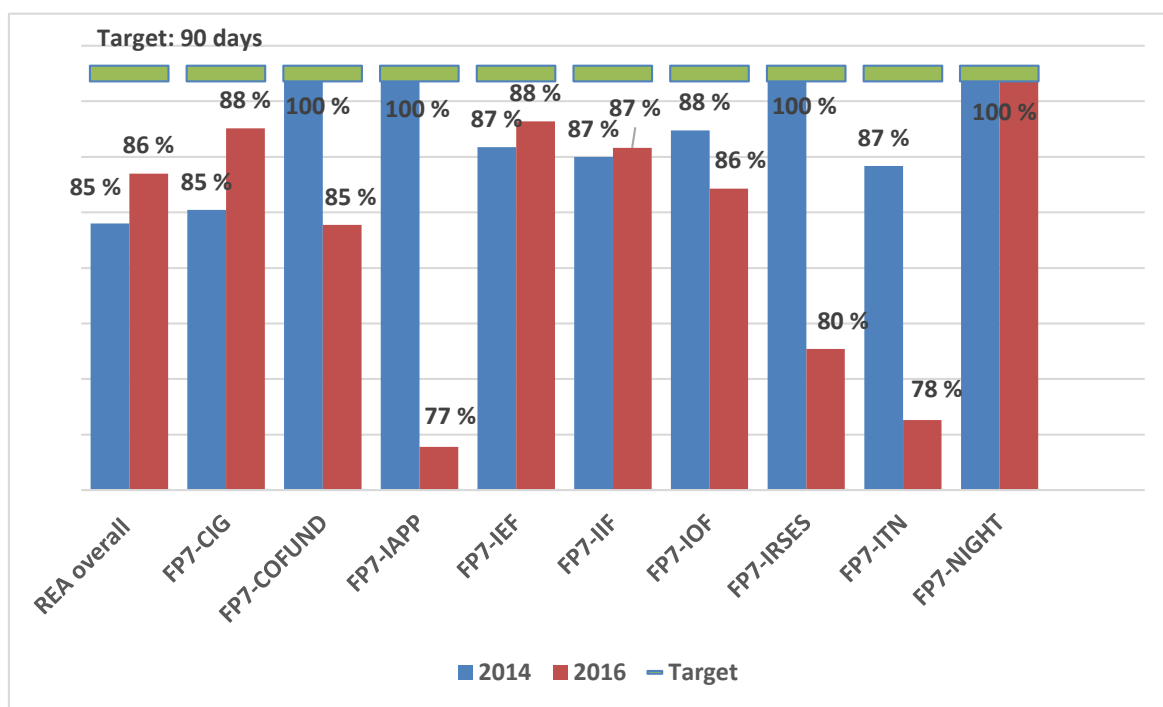
Pre-financing payments should be paid by REA within 30 days (the target was 20 days before 2014). Data provided by REA shows that by large, pre-financing payments have been made within this target range. For both FP7 and Horizon 2020 projects funded since 2012, 96% or more off pre-financing payments have consistently been made within target.

REA overall has seen a significant improvement in the overall processing and completion of interim and final payment. From 2012, there has been a year-on-year increase, which peaked in 2015 with 96% of all payments being made within the 90 day target. There also has been improvement in the proportion of FP7 payments made on time from 90% in 2012 to 97% in 2015.

Detailed time-to-payment data was reviewed for 2015 and 2016. Figure 22 shows that during these two periods, the vast majority of planned payments for MSCA projects had been made on time. There are notable exceptions for FP7-IAPP payments in 2016, and FP7-ITN payments in 2016, where only 77% and 78% of payments respectively have been made on time.

This suggests that by large, REA managed to make payments within the targets set, preventing bottlenecks and allowing beneficiaries to utilise programme resource in a timely fashion, as well as meet project timeframes.

Figure 22. Time-to-payment of interim/final payments, FP7 MSCA projects in 2014 and 2016



Source: REA, ICF analysis

3.1.4 Efficiency and cost-effectiveness of monitoring mechanisms applied by the Commission and REA

The European Commission applies a number of Key Performance Indicators (KPI) to monitor programme implementation and management by REA. A review of indicators used as well as interviews with stakeholders involved in monitoring REA's performance suggest that the following KPIs are particularly efficient and effective in monitoring programme performance and efficiency.

- Average TTP per year (for interim and final payments)
- Implementation of commitment and payment appropriations
- Share of redress cases upheld in comparison with the number of proposals evaluated
- Share of closed projects that achieved all or most of their objectives
- Budget execution of commitment and payment appropriations
- Average number & value of running projects managed 'per' staff (in FTE)

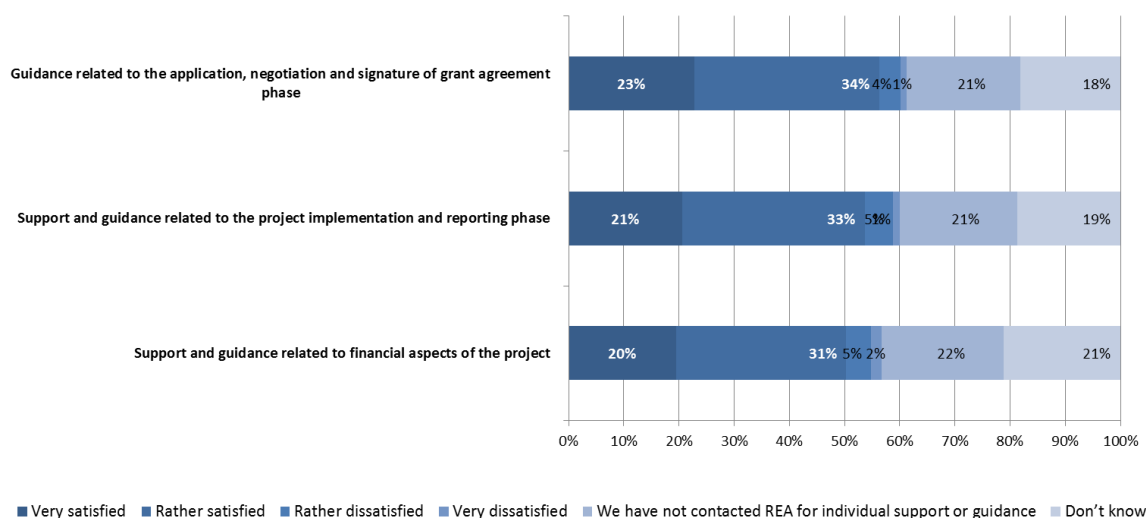
These KPI should continue be collected regularly and reported in concise and accessible format.

As regards monitoring and reporting mechanisms applied by REA to oversee project implementation, the online survey of MSCA organisations allows a detailed analysis.

Host organisations were asked about the appropriateness of the support and guidance they received from the REA in each phase of the implementation of their MSCA grant agreement. Almost a quarter of respondent organisations did not contact the REA for individual support or guidance. Of those organisations that did however, respondents were largely satisfied with all three areas of REA support (detailed in Figure 23), with over half indicating they were rather or very satisfied with support relating to the application and negotiations, the implementation phase and financial aspects of their

projects and with only very few organisations being either rather or very dissatisfied (5 to 7%).

Figure 23. Individual support and guidance received from the Research Executive Agency



Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 95: How would you assess the individual support and guidance you received from the Research Executive Agency during the implementation of your MSCA grant agreement? At least 2 098 respondents replied to this question.

3.1.5 Simplification

The programme has undergone significant simplification under H2020, which has been welcomed by stakeholders¹³⁰. This included extending the use of simplified forms of grants (unit costs), streamlining the number of MSCA funding schemes (from 11 to 4) and unifying the rules and framework conditions for mobility. There are, however, concerns voiced by a number of National Contact Points that certain restrictions may deter some potential applicants, e.g., the fact that beneficiaries, many of whom are SMEs, cannot recruit fellows to go on secondments under RISE. Thus, stakeholders interviewed during this evaluation reported that further simplification may be possible. There are also persisting conflicts between mobility rules and some national labour regulations.¹³¹ A conflict between the minimum length of national PhD programmes and the maximum length of ITN has been raised as a central issue by some NCPs. The 4 years duration for a PhD programme collides with the 3 years duration of the ITN.

3.2 Programme implementation

3.2.1 Effectiveness and appropriateness of administrative and financial rules

Programme beneficiaries as well as national stakeholders were asked about the effectiveness and appropriateness of administrative and financial rules. National stakeholders generally commended the effectiveness of administrative and financial implementation of the programme. However there are some concerns on the

¹³⁰ Science Europe (2016) Science Europe position statement: The Framework Programme that Europe needs. D2016.13.324.10 ; The MSCA Advisory Group.

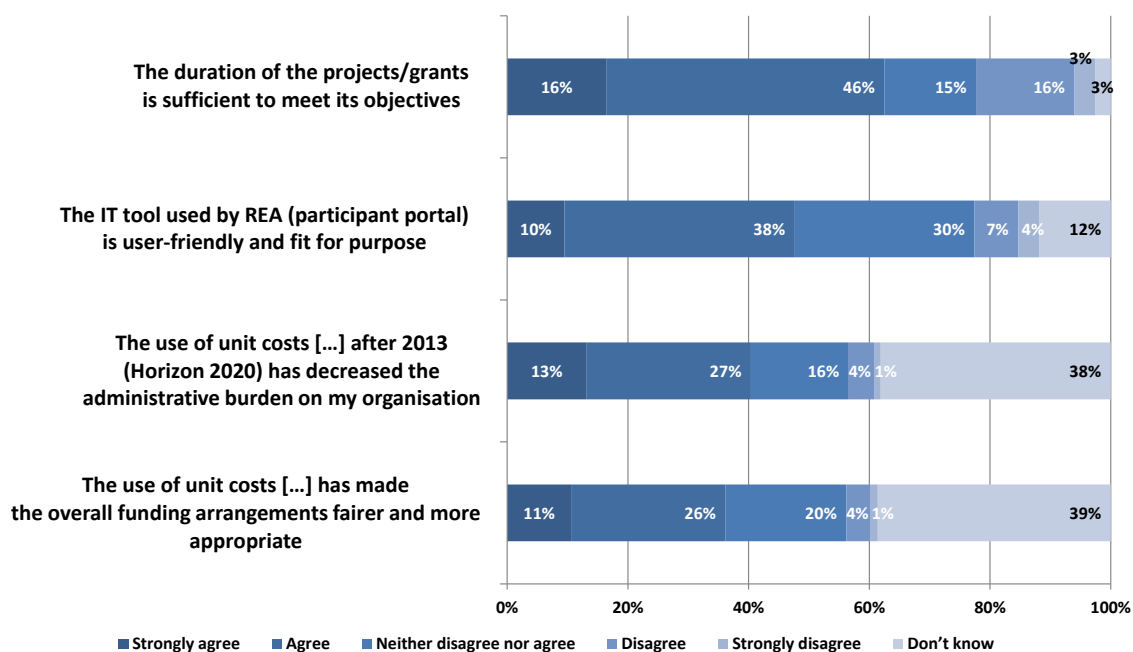
¹³¹ E.g. French labour regulation mandates that employers need to justify why a position is filled with a non-French applicant.

implementation mode of RISE – reporting requirements seem very extensive for these actions given the average amount of EU funding is lower than in other MSCA projects.

When asked about the effectiveness and appropriateness of administrative and financial rules, more than half of all MSCA participant organisations responding to the online survey indicated that they are satisfied with different aspects of the administrative and financial programme implementation. However, there were also some aspects where respondents voiced dissatisfaction. For instance, 20% of respondents disagreed or strongly disagreed with the statement “The duration of the projects/grants is sufficient to meet its objectives”. This was mostly true for ITN projects, where also a number of national stakeholders voiced concern that the contract duration for recruited researchers was too short.

11% of beneficiary organisations disagreed or disagreed strongly with the statement “the distribution of responsibilities and roles of different actors, i.e. the REA and National Contact Points, is clear and efficient”. A minority of respondents disagreed or strongly disagreed with the statement “The IT tool used by REA (participant portal) is user-friendly and fit for purpose” (11%).¹³² Perceptions of users do not differ between FP7 and H2020 beneficiaries.

Figure 24. Effectiveness and appropriateness of administrative and financial rules (views of funded organisations)

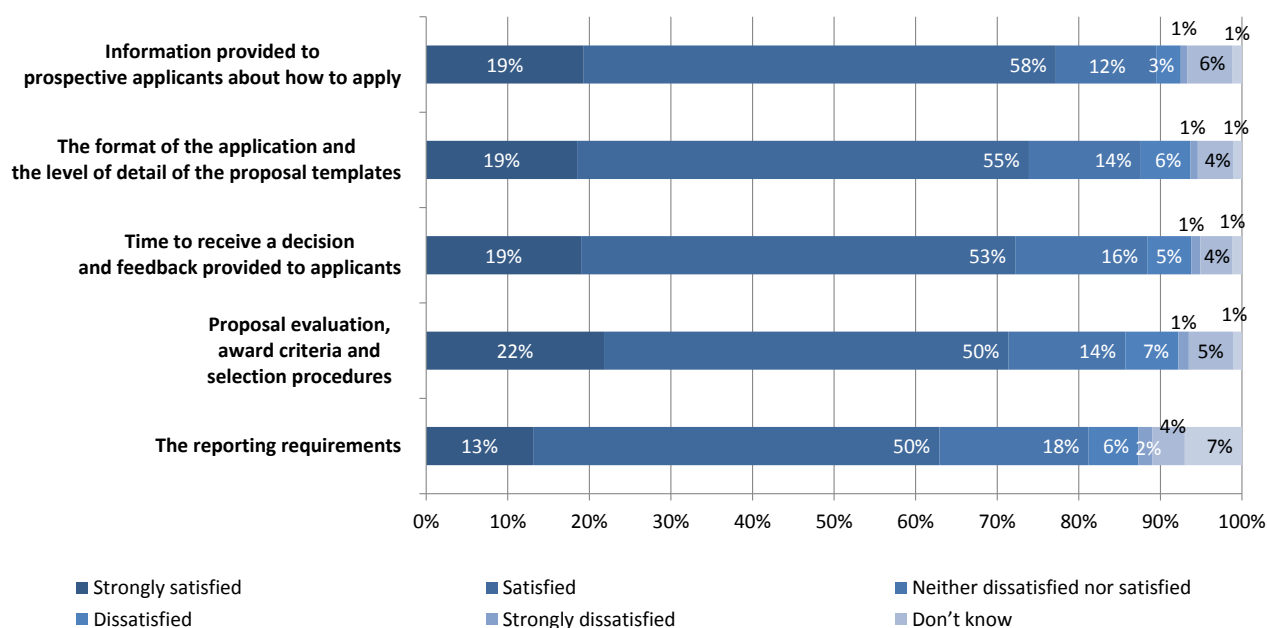


Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 90: To what extent do you agree or disagree with the following statements? At least 899 participants responded to this question.

Funded organisations were also asked to what extent they are satisfied with administrative mechanisms and reporting procedures of the MSCA programme. By and large, respondents were satisfied with the aspects listed in Figure 25 below. A minority of respondents were dissatisfied with the reporting requirements (8%) and proposal evaluation, award criteria and selection procedures (8%).

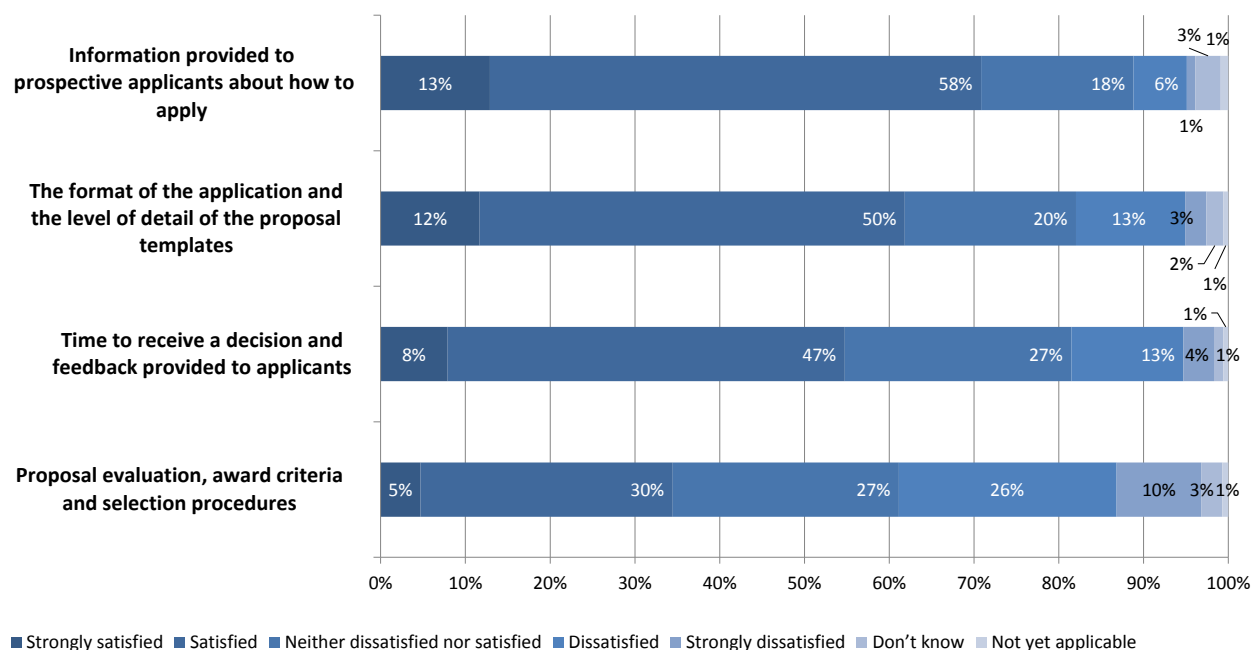
¹³² It should be noted that all Commission services, including REA, use the IT tool known as participant portal.

Figure 25. Satisfaction of funded organisations with administrative mechanisms and reporting procedures



Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 92: Based on your experience with the MSCA application process and MSCA project participation, please indicate your level of satisfaction with the following aspects of the administrative mechanisms and reporting procedures of the MSCA programme. The number of participants that responded to this questions was 2 115.

Figure 26. Based on your experience with the MSCA application process, please indicate your level of satisfaction with the following aspects of the administrative mechanisms and reporting procedures of the MSCA programme.



Source: Survey of comparison group of organisations – Question 24. Based on your experience with the MSCA application process and MSCA project participation, please indicate your level of satisfaction with the following aspects of the administrative mechanisms and reporting procedures of the MSCA programme. The number of respondents to this questions was 4 635.

The comparison group of organisations were also asked about their experience relating to the MSCA application process and MSCA project participation. Again, the feedback overall was positive. As is to be expected among unsuccessful applicants, respondents were least satisfied with guidance and information on the proposal evaluation, award criteria and selection procedures.

3.2.2 Appropriateness of budget

3.2.2.1 Overall programme budget

National stakeholders interviewed generally felt that the budget of the MSCA programme is not appropriate, reflected in particular in Horizon 2020 by low success rates and a large proportion of proposals passing the quality threshold and not being funded (MT, SE, IE, UK, HU, CZ, EL, CY, LT, DE).

There were also some national stakeholders who voiced concern about how the budget is currently spread between different MSCA projects, in particular IF and ITN were perceived to be in need of a budget increase.

ITN accounts for 59% of the total EC contribution allocated, IF for 21%, RISE for 11% and COFUND for 8%. NIGHT actions funded so far account for 1% of the EU budget spent.¹³³

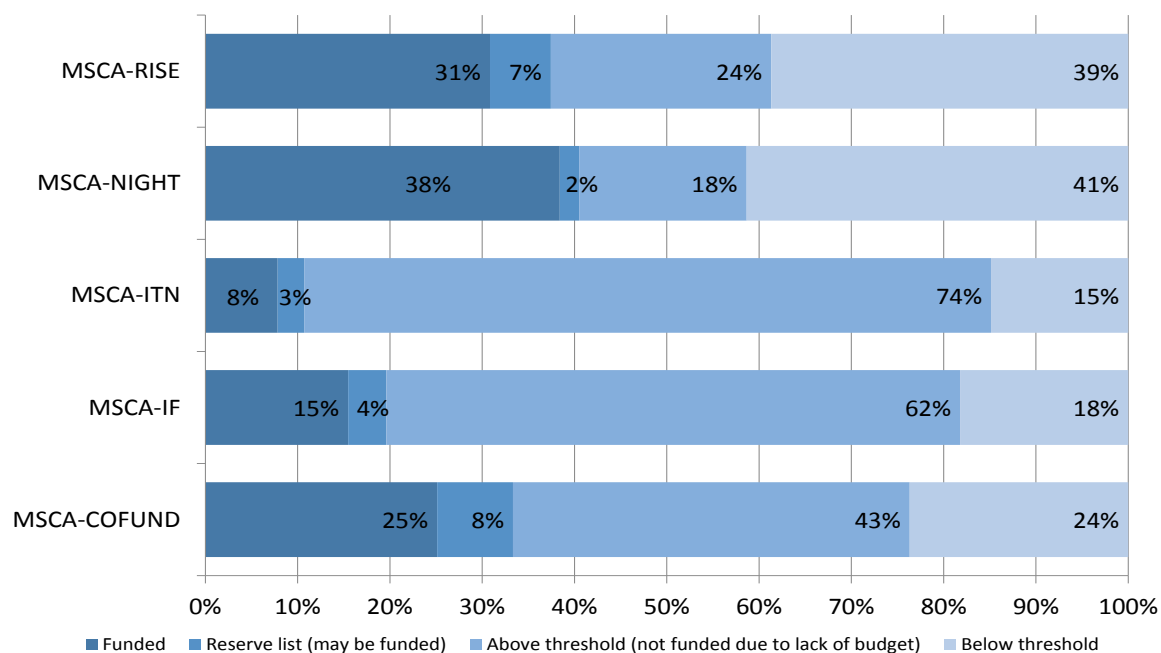
When looking at the evaluation outcome of MSCA proposals under Horizon 2020 so far, it is indeed noticeable that across all actions, 78% of proposals pass the quality threshold but are not funded.¹³⁴ This is compared to 17% of all proposals which are funded, and 5% of all proposals which have been put on the reserve list, i.e. might be funded.

When investigating evaluation outcomes of MSCA proposals in Horizon 2020 so far by type of action (Figure 27 below), there are appreciable differences in success rates by proposals submitted and the amount of high quality proposals not funded between the individual MSCA projects in Horizon 2020 so far. Views by national stakeholders are supported by data available to the study team, in that the oversubscription rate is highest for ITN, with ten times more high quality proposals submitted compared to proposals funded. For IF there were around five times as many high quality proposals than proposals funded so far, whilst RISE was less oversubscribed, with around two times as many high quality proposals than proposals funded so far under Horizon 2020 (cf. Figure 27 and Table 4 above).

¹³³ Note that 2016 Calls for IF and COFUND were not completed by this date and therefore the data refer only to 2014 and 2015 for these two actions. In contrast, the other actions cover calls in 2014, 2015 and 2016.

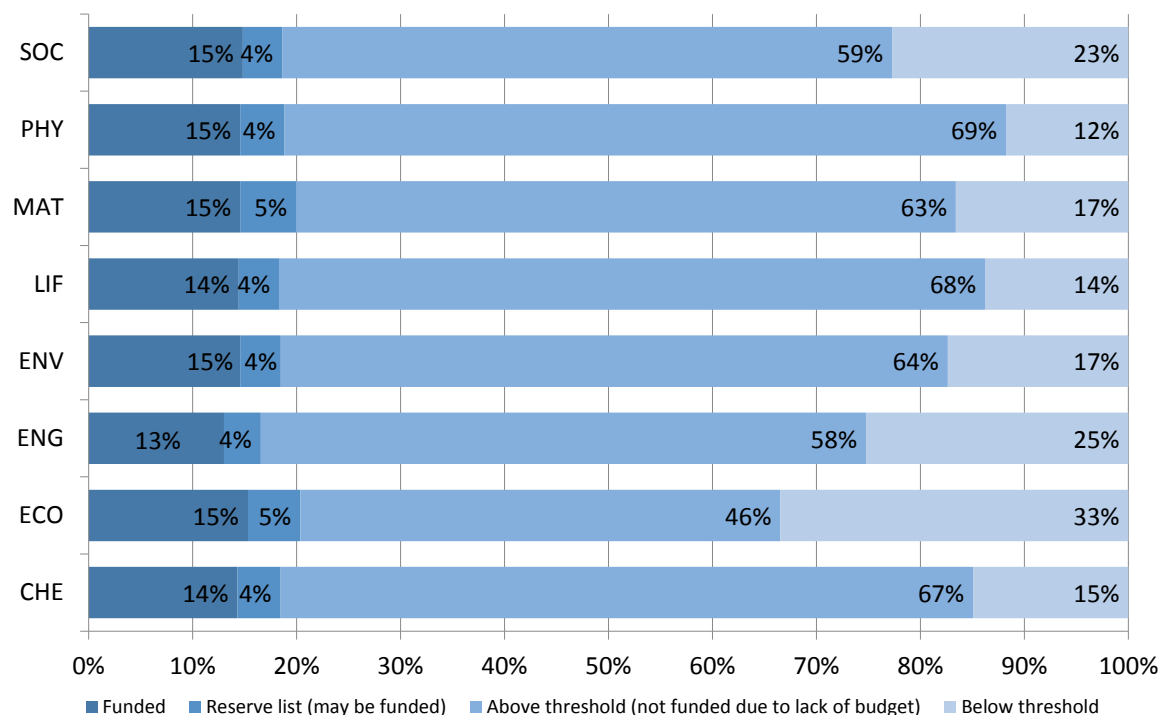
¹³⁴ Evaluation status 'Reserve', hence may be funded at a later stage, and 'No money', hence above threshold but not funded due to lack of budget.

Figure 27. Evaluation outcome of MSCA proposals in Horizon 2020, by type of action



N= 21 047, ineligible, duplicate and withdrawn proposals are excluded. Data includes all H2020 MSCA proposals evaluated by June 2016.

Figure 28. Evaluation outcome of MSCA proposals in Horizon 2020, by scientific panel



N=20 603, ineligible, duplicate and withdrawn proposals are excluded, proposals without scientific panel submitted to MSCA NIGHT calls are excluded. Data includes all H2020 MSCA proposals evaluated by June 2016.

Figure 28 above offers further analysis of evaluation outcome in Horizon 2020 so far by scientific panel. It shows that the proportion of proposals which have passed the quality threshold but have not been funded¹³⁵ is highest in physics, life science and chemistry.

Overall the evidence suggests that the programme budget is not appropriate by a substantial extent, and the issue is particularly pertinent for MSCA ITN and MSCA IF actions.

Taking demand from the calls for proposals with deadlines in 2014-2016 as an approximation of future demand within Horizon 2020, and using overall EU budget allocated to MSCA under Horizon 2020, Table 8 below provides an overview of three scenarios related to programme budget and oversubscription rates.

Table 8. Budget scenarios for MSCA under Horizon 2020, in EUR

	Scenario 1 - no change	Scenario 2 – double ITN budget¹³⁶	Scenario 3 – double IF budget¹³⁷	Scenario 4 – Fund all high quality proposals
MSCA-COFUND	0.50	0.50	0.50	1.51
MSCA-IF	1.48	1.48	2.96	7.69
MSCA-ITN	3.65	7.3	3.65	39.75
MSCA-NIGHT	0.06	0.06	0.06	0.09
MSCA-RISE	0.47	0.47	0.47	1.09
Total	6.16	9.82	7.64	50.13
Budget change	0	+3.65	+1.48	+43.97

Note: MSCA budget breakdown based on EU contribution spend so far and estimated overall programme budget of EUR 6.16 billion (expressed in 2011 current prices), MSCA demand breakdown based on demand up to 2016. Only high quality proposals are considered in demand estimates. Demand from duplicated, ineligible, withdrawn and rejected proposals is excluded from the estimates.

3.2.2.2 Individual project budgets and funding levels

The MSCA programme aims to be a highly competitive, attracting the best researchers from around the world – on key aspect of achieving this goal is to offer adequate and attractive project budgets and levels of EU contribution.

Data collected as part of a Mid-term review of MSCA unit costs, conducted by ICF, provides evidence that this aim is indeed achieved¹³⁸. Findings that are largely confirmed by the online surveys conducted as part of the present MSCA evaluation.

¹³⁵ Evaluation status 'Reserve', hence may be funded at a later stage, and 'No money', hence above threshold but not funded due to lack of budget.

¹³⁶ All else equal, this would reduce oversubscription rate of ITN throughout the duration of H2020 to 4.4.

¹³⁷ All else equal, this would reduce oversubscription rate of IF throughout the duration of H2020 to 1.6.

¹³⁸ ICF (2017). Mid-term review of MSCA unit costs. <https://publications.europa.eu/en/publication-detail/-/publication/0f44192e-5499-11e7-a5ca-01aa75ed71a1/language-en/format-PDF/source-31288412>

The main recommendation emerging from the unit cost study is to increase the living allowance by 5%, to adjust for inflation.¹³⁹

Overall, MSCA fellows seem satisfied with the level of the living allowance (top-up allowance for RISE).¹⁴⁰ None of the fellows view the living allowance as overly generous. More than four out of five fellows rate the unit cost as generous (19%) or adequate (65%). The mid-term review also finds that 12% of the fellows perceive their living allowance to be insufficient and 4% find it by far insufficient.

Fellows' rating of the adequacy of the living allowance differs across actions as shown in Table 9. While none of the fellows in COFUND (10 of which are ESR) and ITN perceive their living allowance as too low, a quarter of IF fellows report it to be insufficient. This may point to a difference in the adequacy of the living allowance for ESR and ER.

Four out of ten RISE fellows report the top-up allowance, which currently amounts to EUR 2 000 per month, to be insufficient (17%) or by far insufficient (25%).

Table 9. Responses by type of action (only fellows): How would you rate the adequacy of the living allowance (COFUND, IF, and ITN) / top-up allowance (RISE)?

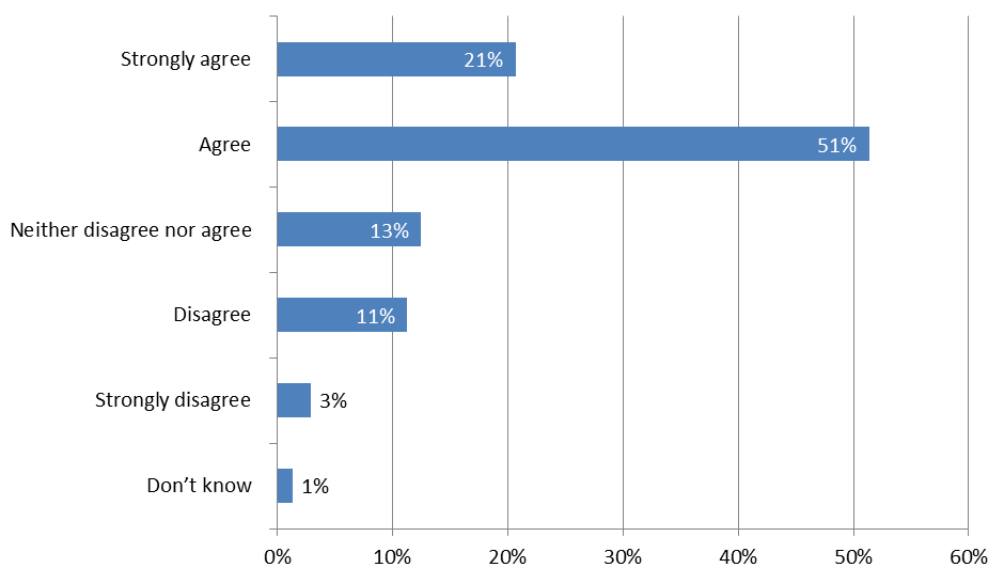
Rating of adequacy of living/top-up allowance	COFUND		IF		ITN		RISE		Total	
	N	%	N	%	N	%	N	%	N	%
By far insufficient	0	0%	0	0%	0	0%	3	25%	3	4%
Insufficient	0	0%	8	25%	0	0%	2	17%	10	12%
Adequate	11	85%	18	56%	18	69%	7	58%	54	65%
Generous	2	15%	6	19%	8	31%	0	0%	16	19%
Overly Generous	0	0%	0	0%	0	0%	0	0%	0	0%
Total	13	100%	32	100%	26	100%	12	100%	83	100%

¹³⁹ The analysis carried out as part of the unit cost study found that the purchasing power of researchers' salaries has remained constant over the past years but that salaries have been adjusted for inflation. Updating the MSCA living allowances in line with trends in researchers' salaries by adjusting them for the inflation rate in Belgium for the years 2014, 2015, 2016, and 2017 (projected by the National Bank of Belgium) would amount to a 5.0% change. Belgium has been chosen (together with Luxembourg) as the reference country used in the calculation of the country correction coefficients (<http://ec.europa.eu/eurostat/web/civil-servants-remuneration/correction-coefficients>). Applying the country correction coefficient to living allowances will correct for differences in the development of living costs between countries.

¹⁴⁰ Fellows were asked to rate the adequacy of the living allowance including potential top-ups by the host institution. 29% of coordinators state that they top-up fellows' living allowance (top-up allowance for RISE).

Source: ICF (2017) MSCA unit cost study, final report.

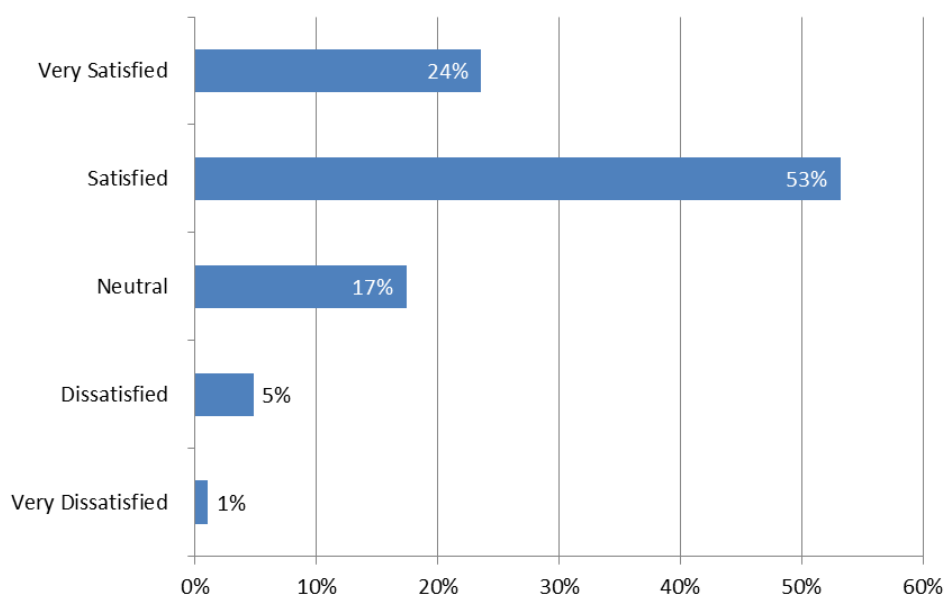
Figure 29. MSCA offers funding rates that meet the financial needs of funded projects



Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 103: To what extent do you agree or disagree with the following statement? - MSCA offers funding rates that meet the financial needs of funded projects. 2 109 respondents replied to this question

As part of the online survey, host organisations were asked to what extent MSCA offers funding rates that meet the financial needs of funded projects as well as their satisfaction with the funding arrangements (see Figure 29 and Figure 30).

Figure 30. How would you rate your overall satisfaction with the funding arrangements under the MSCA programme?



Source: MSCA evaluation - IF, ITN, COFUND Organisations – Question 104: How would you rate your overall satisfaction with the funding arrangements under the MSCA programme? 2 161 respondents replied to this question.

Almost three-quarters of the IF, ITN, COFUND organisations (72%) believed that the MSCA funding rates meet the resource needs of those projects funded under the programme, whereas 14% did not. Satisfaction among host organisations with respect to the funding arrangements was also high with 79% of respondents indicating that they were either satisfied or very satisfied.

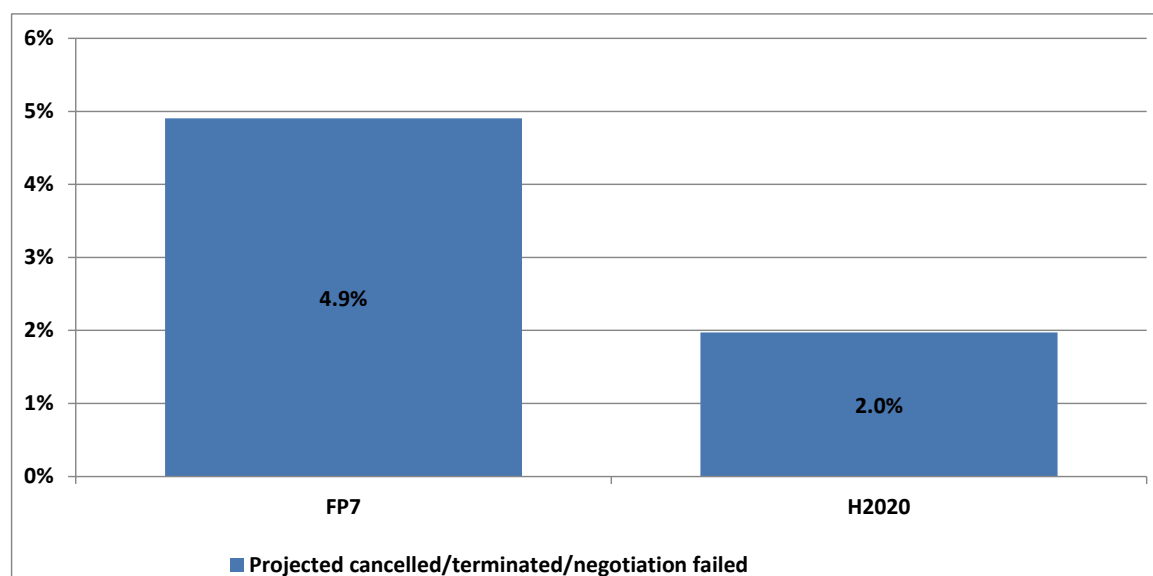
Respondents to both the IF and ITN fellows' surveys were asked about the level of MSCA funding rates and its appropriateness in supporting fellows through their programmes.

Overall, IF and ITN fellows held broadly similar views with respect MSCA funding's ability to fully cover the cost of living – almost all ITN respondents (94%) and four-fifths of IF fellows (79%) agreed or strongly agreed that the allocation entirely covered living costs. Whilst proportionally the fewest respondents in both surveys agreed that funding took account of their family situation (51 and 49% of IF and ITN fellows), many were unsure and reported not knowing. In fact the more contentious statement for both ITN and IF fellows surround mobility costs, with a minority of respectively 11 and 15% disagreeing that MSCA fellowships sufficiently contribute to the costs associated with moving country, or finding new accommodation.

3.2.3 Efficiency of activities carried out under the programme

One way to look at the efficiency of the activities carried out is to identify the proportion of projects which have been cancelled, terminated or where contract negotiation has failed. This offers a rough approximation to the degree of misallocation of funds, and lost EU funding. A caveat being that there are many reasons, unrelated to programme efficiency, for negotiations to be terminated. For instance, with respect to fellowships, a fellow may have found another position. Figure 31 shows the proportion of cancelled/terminated projects against the proportion of projects still under negotiation.

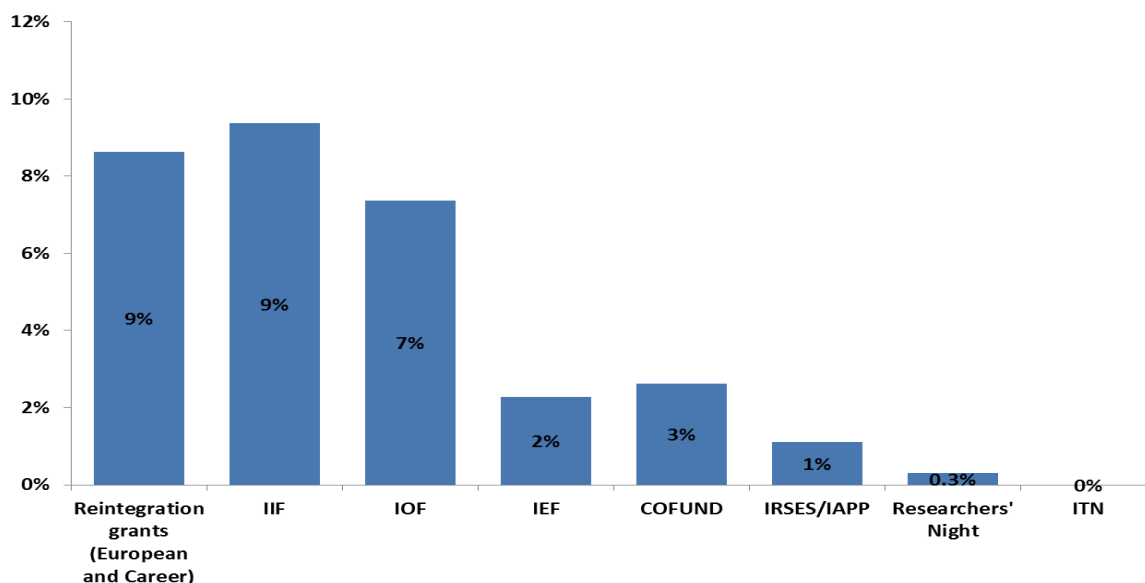
Figure 31. Projects cancelled, terminated or negotiation failed in FP7 and Horizon 2020



Source: ICF CORDA analysis, at the time of data extraction 36.4% of projects were ongoing in FP7, compared to 95.7% in Horizon 2020. 57.3% of FP7 projects had closed, whilst none of the Horizon 2020 projects had closed.

In MSCA, around 5% of projects were cancelled or terminated. In Horizon, the number is distinctly different. So far, 2% of projects have been cancelled, or terminated.

Figure 32. Proportion of cancelled/terminated projects, in FP7, by type of action



Source: ICF CORDA analysis, ongoing and closed projects are excluded.

For FP7, it is worthwhile to look at the proportion of cancelled/terminated projects by type of action, to see if any specific inefficiencies can be located.

Figure 32 above looks at the issue by type of MSCA action in FP7. A notable percentage of reintegration grants and international fellowships (9 – 7%) have been terminated. This tells us that the EU budget allocated to Reintegration grants and international fellowships saw a larger proportion of lost spending, probably due in large part to fellows finding other employment opportunities.

For Horizon 2020, a similar analysis has not been undertaken due to the fact that the programme is still ongoing.

3.2.4 Cost-effectiveness vis-à-vis other mechanisms

There are various ways how cost-effectiveness of the MSCA delivery instruments (i.e. the MSCA projects) can be assessed. One way is to look at the management overhead of MSCA projects, and whether these are adequate and reasonable. The MSCA unit cost system dedicates only a small share to management and indirect costs of the MSCA projects. The percentage of project funds allocated to this unit cost is 22% for ITN¹⁴¹ and 11% for IF.¹⁴² The unit cost for management and indirect costs is higher for ITN than for IF because of the extensive networking character and related coordination effort related to the former. The Mid-term Review of MSCA unit costs provides evidence that MSCA funding is, as intended, invested in the quality of MSCA fellows' research. 87% of MSCA fellows agree or strongly agree with the statement "My host institution has spent/spends the MSCA funding for research, training and networking costs to support the quality of my research and training". The answers do not vary across MSCA projects.

¹⁴¹ 1 200 EUR/month for management and indirect costs compared to 3 110 EUR/month for researchers' living allowance, 600 EUR/month for researchers' mobility allowance and 1 800 EUR/month for research, training and networking costs.

¹⁴² 650 EUR/month for management and indirect costs compared to 4 650 EUR/month for researchers' living allowance, 600 EUR/month for researchers' mobility allowance and 800 EUR/month for research, training and networking costs.

Given that, relatively few resources are spent on management and indirect costs of MSCA projects; in many cases the MSCA unit costs for research, training and networking do not cover the real costs; and given that insufficiencies in MSCA funding are usually not felt by MSCA fellows as host-institutions provide them with very good research conditions and if necessary complement MSCA funding with other sources of funding; - there are no indications that other instruments of funding mechanisms could achieve a higher level of cost-effectiveness.

4 Effectiveness

Effectiveness analyses the progress made towards achieving the objectives of the intervention –exploring whether or how the changes were linked to the intervention.

4.1 Achieving programme specific objectives: strengthening skills, training and career development

The analysis presented in this section will distinguish the impact of MSCA on researchers (individual level impact), the impact of MSCA on organisations, and the impact of MSCA at the system level.

According to MSCA's intervention logic, MSCA fellows can be expected to find very good working conditions at their host institutions. In particular, all MSCA fellows should have:

- Access to high quality training for improving their scientific/technical skills and transferable skills;
- Opportunities for collaboration with researchers from other disciplines, sectors and countries, including secondments;
- Access to high quality doctoral supervision (only ESR);
- Sufficient time and resources for conducting research;
- Access to career advice and support offered by their host organisation towards the end of their fellowship.

If the above conditions are fulfilled, this should translate into excellent research and excellent employment outcomes of researchers funded under MSCA.

At the organisational level, MSCA is expected to:

- Help improve the institutional structures for induction, training and career development for researchers in line with the Principles for Innovative Doctoral Training and the Charter and Code;
- Contribute to the development of the European Research Area through the creation of interdisciplinary, cross-sectoral and international collaboration and increased mobility of researchers;
- Increase the research capacity of organisations.

This section will also elaborate to what extent individual level effects and organisational level effects can be expected to aggregate to system level effects of MSCA.

To evaluate to what extent MSCA has achieved its objectives, this section makes use of evidence collected as part of surveys among MSCA fellows and participating organisations as well as a comparison group of researchers and organisations. The survey data is further complemented with data collected through desk research, interviews with key informants and case studies.

4.1.1 The impact of MSCA on researchers' skills, networks, employability, international mobility, career development and excellence

4.1.1.1 Impact on researchers' skill acquisition

One of the main mechanisms through which MSCA intends to ensure the employability of researchers and their ability to conduct excellence research is to provide researchers with excellent training and career development opportunities.

Fellows rate MSCA's training and professional development dimension very positively. Over three quarters are (very) satisfied with the training and professional development opportunities they received during their MSCA fellowship (Table 10). Only a small minority (7%) of fellows surveyed report to be (very) dissatisfied, with only negligible differences between actions.

Table 10. Responses to by actions (only fellows): To what extent were you satisfied with the training and professional development opportunities provided during your MSCA fellowship

To what extent were you satisfied with the training and professional development opportunities provided during your MSCA fellowship?	Cofund	IF	ITN	RISE/IA PP/IRSES	Total
Very satisfied	45.8%	49.7%	36.0%	50.6%	43.0%
Satisfied	32.7%	30.4%	40.9%	33.7%	36.0%
Neither dissatisfied nor satisfied	10.6%	11.0%	13.6%	10.1%	12.0%
Dissatisfied	3.7%	3.5%	6.1%	2.3%	4.6%
Very dissatisfied	3.4%	2.1%	2.4%	1.9%	2.4%
Not applicable	3.8%	3.3%	0.9%	1.4%	2.0%
Grand Total	100%	100%	100%	100%	100%
N	791	1 416	2 492	741	5 440

The volume of training per year (in days) received by fellows differs substantially between ITN on the one hand and COFUND and IF on the other hand. This indicates that the strong intended focus of ITN on intensive initial training for ESR is indeed put into practice: Table 11 shows that about 31% of ITN fellows received at least 20 days of training per year during their fellowship, and an additional 31% received between 10 and 20 days of training per year. Only a small minority received only 1-2 days of training per year. Under COFUND and IF, the volume of training received by fellows is substantially lower than under ITN: about two thirds of COFUND and IF fellows received 1-10 days of training per year and one third received at least 10 days.

Overall, two thirds of fellows are (very) satisfied with the volume of training they received during their fellowship and only 12% of fellows were (very) dissatisfied (not shown here).

Table 11. Responses by action (only COFUND, IF and ITN fellows): How much formal training (courses) did you receive during the fellowship per year?

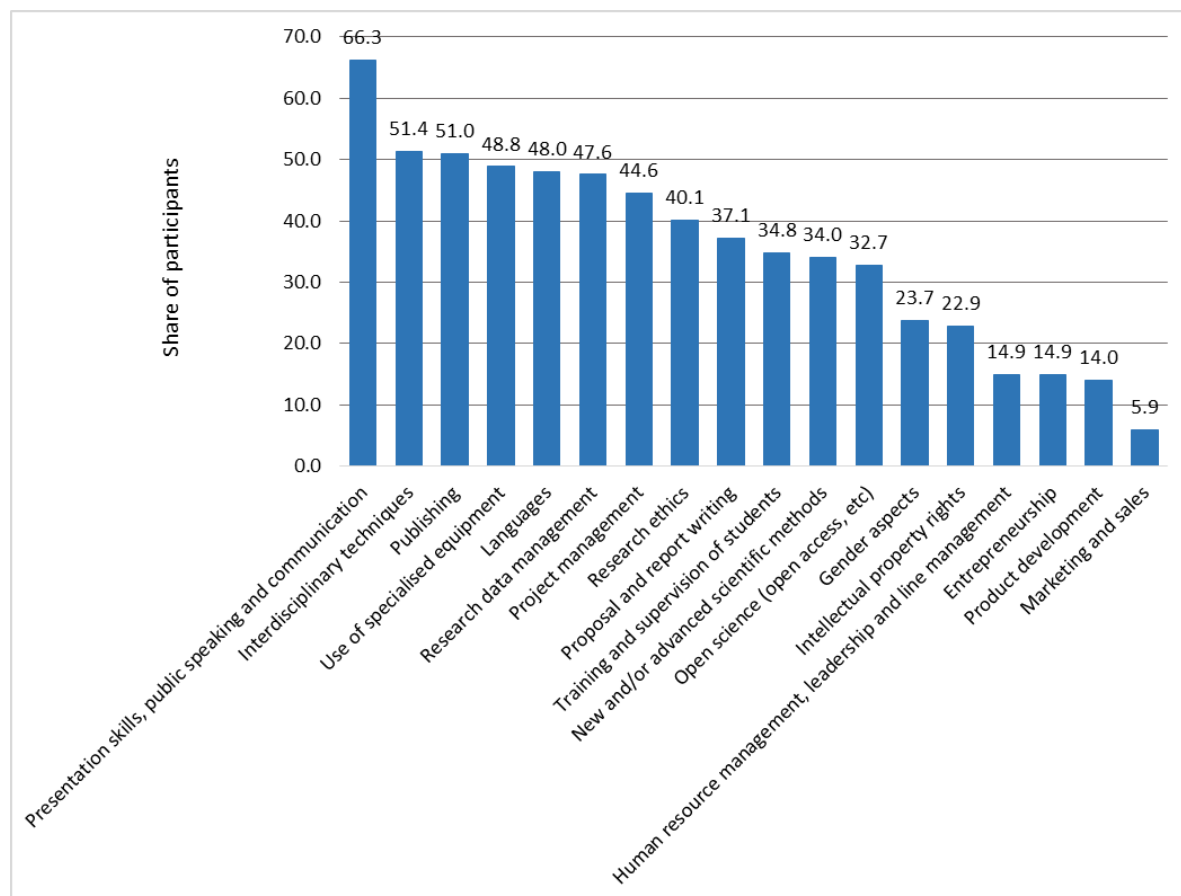
How much formal training (courses) did you receive during the fellowship per year?	COFUND	IF	ITN	Total
More than 20 days	10.1%	12.4%	30.9%	22.6%
10-20 days	15.2%	18.3%	31.0%	25.0%
2-10 days	43.8%	43.7%	32.1%	37.1%

How much formal training (courses) did you receive during the fellowship per year?	COFUND	IF	ITN	Total
1-2 days	30.9%	25.6%	6.1%	15.3%
Total	100%	100%	100%	100%
N	685	1 307	2 610	4 691

Note: The question was not asked to RISE/IAPP/ IRSES as the training per year measure is not suited for the activities funded.

A substantial share of fellows reports that the formal and informal training they received during the MSCA fellowship was effective in equipping them with important skills (see Figure 33). The skills fellows report most frequently to have acquired to a (very) large extent include both skills specific to the research profession, such as interdisciplinary techniques (51%), skills associated with getting published (51%), the use of specialised equipment or research data management (49%), and transferable skills, such as presentation skills (66%), languages (48%) and project management skills (47%). Skills acquired least often to a (very) large extent include skills necessary for bringing research findings to the market, such as entrepreneurship, product development and skills for marketing and sales.

Figure 33. Share of fellows surveyed who indicate to have acquired skills to a large or very large extent (in%)



Note: N=5,622

Those fellows who indicated to have acquired a skill to a (very) large extent during the fellowship were asked what type of training they followed to develop this particular skill. The results show that various types of training allowed fellows to acquire skills to a (very) large extent and the pattern is similar across types of skills: most often these fellows followed taught courses and workshops and seminars, followed by on the job-training. Fewer fellows indicated to have acquired skills during secondments/placements and online e-learning.¹⁴³

Also managing the MSCA project itself can help fellows to build skills: An MSCA COFUND fellow interviewed as part of this study indicated that without the fellowship, the researcher would not have been able to set up and manage a research project autonomously, as he would have been dependent on funds of the team leader.¹⁴⁴

First, the fellow considered it most likely that without COFUND, the fellow still would have worked in the same research group under the same team leader – but not in an autonomous project (i.e. in that case, funding would have come from the team leader's project and the fellow assessed this then to be "the fellow's independent project").

Employability and excellence also requires researchers to have access to training in all areas in which they feel their skills need to improve. The majority of survey respondents report that an MSCA fellowship offers this: around 62% of MSCA fellows are (very) satisfied with the areas covered by the training that was offered to them, and this compares favourably against responses from comparison group researchers (55%), as shown in Table 12. The responses also show that the share of (very) satisfied researchers is particularly high for ITN fellows (and to a lesser extent IF fellows), indicating that in line with their objectives the innovative training networks lead to training opportunities - in terms of areas covered - that are not usually available elsewhere.

Table 12. Responses by action and comparison group: Overall, were you satisfied with the training offered to you? (Areas covered)

Overall, were you satisfied with the training offered to you? (Areas covered)	COFUND	IF	ITN	Total MSCA fellows	Comparison group
Very Satisfied	17.1%	23.0%	23.4%	22.4%	22.9%
Satisfied	30.8%	36.7%	42.7%	39.3%	32.6%
Neutral	31.3%	26.7%	21.6%	24.4%	27.9%
Dissatisfied	14.9%	9.9%	8.0%	9.6%	12.2%
Very dissatisfied	6.0%	3.7%	4.2%	4.4%	4.5%
Grand Total	100%	100%	100%	100%	100%
N	686	1 294	2 724	4 821	346

Note: Not applicable omitted.

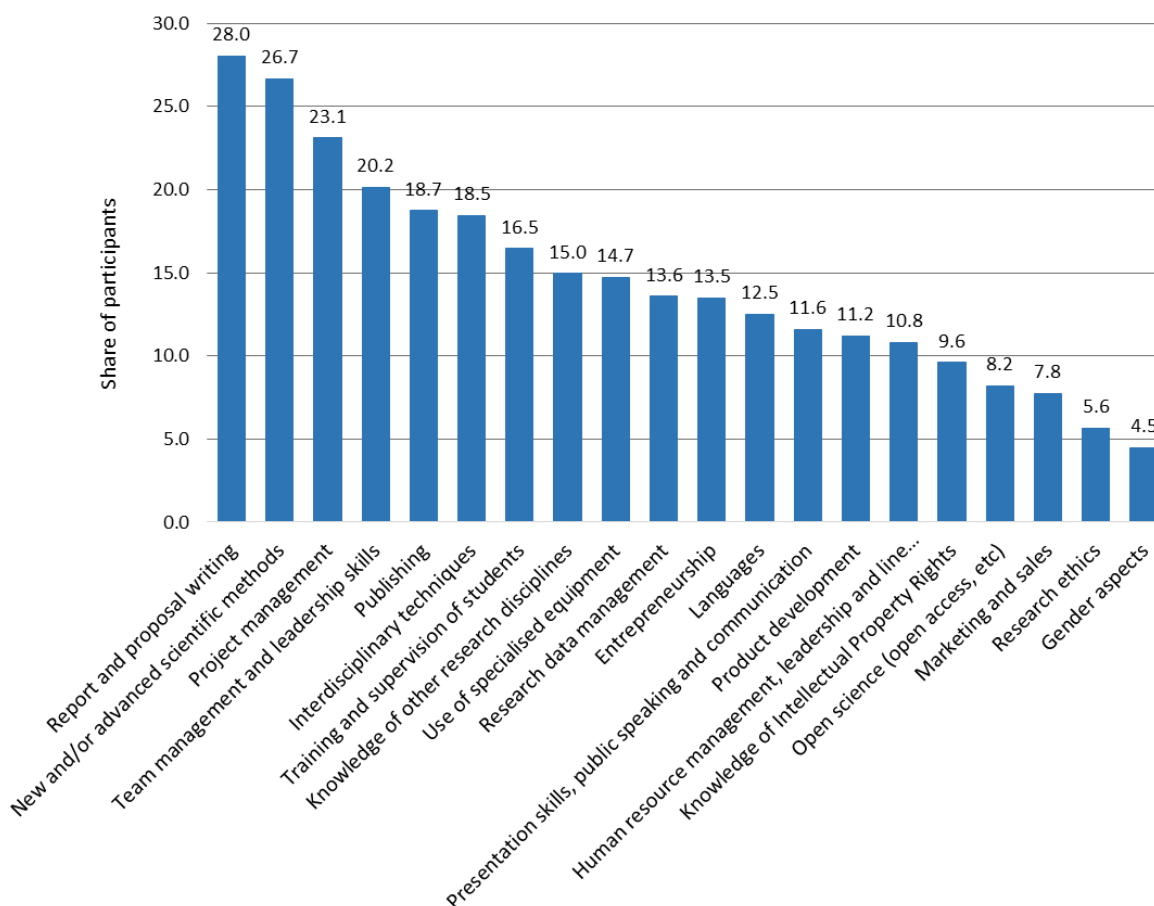
Despite the high levels of overall satisfaction with the breadth of training offers, almost 60% of MSCA fellows who responded to the survey indicated that there were

¹⁴³ For details please see Annex 4.

¹⁴⁴ Fellow of POLONEZ COFUND project.

areas in which they would have liked more training. Figure 34 presents the shares of respondents who would have liked more training in a certain area.¹⁴⁵

Figure 34. Shares of respondents who would have liked more training in a certain area (in%), sorted by share total share



Note: N=5,105.

Figure 34 indicates that the areas of training where fellows' demand for training is most often not satisfied are the areas in which organisations most often provide training, and that the areas where fellows are least often not satisfied are the areas in which fewer organisations provide training (Table 32). This suggests that there are 'high demand' areas of training, such as proposal writing, publishing, and the acquisition of new and/or advanced scientific methods where many fellows wish new training opportunities to be created, or existing training to become more effective. On the other hand, fellows seem to attribute less importance to training areas less directly related to advancing the typical research career, such as gender aspects, marketing and sales, and open science.

4.1.1.2 Impact on the development of researchers' networks

There is a strong emphasis in MSCA on creating, strengthening and maintaining international and cross-sectoral networks/partnerships among researchers in order to facilitate the cross-border and cross-sectoral mobility of researchers and knowledge, during and after the fellowship.

¹⁴⁵ For more details, please see Annex 4.

Fellows overall satisfaction with the partnerships they developed is high, with 8 out of 10 fellows reporting to be (very) satisfied.

Table 13. Responses by action (only fellows): Satisfaction with partnerships developed as a result of your MSCA fellowship

Overall, how satisfied were you/ are you with the partnerships you developed as a result of your MSCA fellowship	COFUND	IF	ITN	RISE/IA PP/IRSES	Total
Very satisfied	52.4%	56.7%	35.4%	47.2%	45.1%
Satisfied	30.4%	26.3%	40.1%	38.5%	34.7%
Neutral	7.7%	6.0%	12.5%	6.8%	9.3%
Dissatisfied	2.8%	1.7%	3.5%	2.1%	2.7%
Very dissatisfied	2.0%	1.2%	1.3%	2.7%	1.5%
Don't know	0.9%	0.3%	0.6%	0.0%	0.5%
Not yet applicable	3.9%	7.8%	6.7%	2.8%	6.1%
Total	817	1,634	2,726	710	5 887
N	100	100	100	100	100

The following tables describe what kinds of collaborations MSCA helped create or strengthen. Table 14 shows that the share of MSCA fellows who carried out research with (other) academic organisations is higher than the share of MSCA fellows who carried out research with non-academic organisations. In line with the MSCA's objective, there is a strong cross-border dimension in MSCA collaborations: (slightly) more MSCA fellows state that they have carried out research with organisations in other countries than state that they have carried out research with organisations in the country of the fellowship.

Table 14. Type of fellows have carried out research with during their fellowship, by action

During your MSCA fellowship, did/do you carry out research with... (share of past fellows stating yes in%)	COFUND	IF	ITN	RISE/ IAPP/IRSES	Total
...researchers from (other) academic organisations in the country in which you did your fellowship?	74.7%	80.8%	64.5%	70.5%	69.6%
...researchers from (other) academic organisations outside of the country in which you did your fellowship?	79.6%	84.8%	78.6%	56.4%	76.7%
...researchers from (other) non-academic organisations in the country in which you did your fellowship?	21.5%	25.4%	26.8%	36.0%	27.0%
...researchers from (other) non-academic organisations outside of the country in which you did your	19.7%	21.6%	32.9%	24.7%	27.8%

During your MSCA fellowship, did/do you carry out research with... (share of past fellows stating yes in%)	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
fellowship?					

Only 12% of MSCA fellows state that they have not created new collaborations during their fellowship. For those fellows who did, Table 15 reports the type of organisations they created new collaborations with. The table shows that for both types of organisations (academic and non-academic), new collaborations are more often cross-border collaborations than collaborations within the country of the fellowship. An exception are collaborations created by IF fellows, which are (slightly) more often national than cross-border.

Table 15. Type of organisations fellows have created new collaborations with during their fellowship, by action

[If respondent indicated that new collaborations were created: Were these new collaborations with... (share of fellows stating yes in%)	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
...researchers from (other) academic organisations in the country in which you did your fellowship?	79.8%	78.5%	59.7%	32.0%	63.7%
...researchers from (other) academic organisations outside of the country in which you did your fellowship?	68.1%	73.5%	87.4%	86.0%	81.1%
...researchers from (other) non-academic organisations in the country in which you did your fellowship?	23.9%	26.5%	38.3%	21.1%	31.0%
...researchers from (other) non-academic organisations outside of the country in which you did your fellowship?	19.1%	20.2%	53.9%	48.8%	39.9%

There is good evidence that the collaborations between researchers created or strengthened during MSCA fellowships are sustained. 8 out of 10 fellows who had developed collaborations with researchers in (other) academic organisations have either fully developed plans or are currently developing plans for further collaboration (Table 16). Sustainability of collaborations with non-academic organisations seems slightly lower, with 7 out of 10 fellows reporting to have either fully developed plans for further collaboration or to be currently developing plans. Table 16 also shows that cross-border collaboration is at least as sustainable as collaboration of researchers within the same country (i.e. the share of fellows having/developing plans for further collaboration with organisations abroad is equal or slightly higher than for collaboration with organisations within the country of the fellowship).

Table 16. Share of fellows having concrete plans for future collaboration with researchers from MSCA network, by action

Do you have any concrete plans for collaboration with (some of) these researchers in the future?	COFUND	IF	ITN	RISE/IA PP/IRSES	Total
...researchers from (other) academic organisations in the country in which you did your fellowship?					
No	14.1%	9.8%	39.4%	19.8%	20.4%
Yes fully developed	40.8%	50.2%	17.7%	33.6%	36.2%
Yes in development	45.0%	39.9%	42.8%	46.6%	43.4%
...researchers from (other) academic organisations outside of the country in which you did your fellowship?					
No	13.2%	9.3%	40.2%	19.6%	19.1%
Yes fully developed	38.7%	48.2%	18.1%	30.5%	35.6%
Yes in development	48.1%	42.5%	41.7%	49.9%	45.2%
...researchers from (other) non-academic organisations in the country in which you did your fellowship?					
No	29.9%	31.8%	55.0%	33.7%	36.7%
Yes fully developed	28.1%	31.8%	11.9%	23.5%	24.3%
Yes in development	41.9%	36.5%	33.1%	42.8%	39.0%
...researchers from (other) non-academic organisations outside of the country in which you did your fellowship?					
No	19.3%	21.7%	49.1%	27.5%	29.4%
Yes fully developed	30.0%	42.9%	16.8%	26.3%	29.2%
Yes in development	50.7%	35.4%	34.2%	46.1%	41.3%

Further evidence of the sustainability of international and cross-sectoral collaboration built or strengthened during MSCA fellowships comes from the bibliometric analysis performed as part of this assignment. Table 17 shows that MSCA fellows' share of publications that involve co-authors from other countries is higher than that of the comparison group of researchers (46% versus 33%). The difference between MSCA fellows and comparison group researchers is particularly apparent for IF. While more than half of the publications of IF fellows between 2007 and 2016 were publications involving international collaboration, this was 35% for the comparison group of researchers similar to IF. For ITN, the bibliometric analysis did not find substantial differences in international collaboration between fellows and comparison group researchers.

Table 17 also indicates that ITN fellows are able to benefit from their cross-sector collaborations established during MSCA projects. Their share of academic-corporate cross-sector publications (4.3%) is significantly higher than the world average (2.6%) and also higher than the cross-sector publication shares of the comparison group of researchers (3.8%).

Table 17. Bibliometric evidence on international and cross-sectoral collaboration of MSCA fellows and comparison group researchers

Publication share of total over the period 2007-2016	MSCA-IF	Comparison group IF	MSCA-ITN	Comparison group ITN	Overall MSCA	Overall comparison group	World average
International collaboration publication share of total	53.5%	34.6%	36.7%	34.5%	45.7%	33.3%	NA
Academic-Corporate cross-sector publication shares of total	3.4%	3.4%	4.3%	3.8%	3.7%	3.4%	2.6%

The survey also asked fellows whether they still cooperate with researchers from their former host-organisation. Between one quarter and one third of past fellows still cooperate with their home institutions and one in five former MSCA fellows still worked at their host-organisation at the time of the survey.

Table 18. Responses by action (only fellows): To what extent do you currently collaborate with your former host institution?

To what extent do you currently collaborate with your former host institution?	COFUND	IF	ITN	Total
To a very great extent	13.2%	16.2%	8.2%	12.3%
To a great extent	19.7%	19.8%	22.5%	20.9%
To a moderate extent	25.9%	18.2%	14.8%	18.5%
To a small extent	14.3%	14.3%	13.0%	13.8%
Not at all	10.9%	8.7%	17.5%	12.7%
I still work at my host organisation	16.1%	22.8%	24.1%	21.9%
	100%	100%	100%	100%
Total	441	790	834	2 065

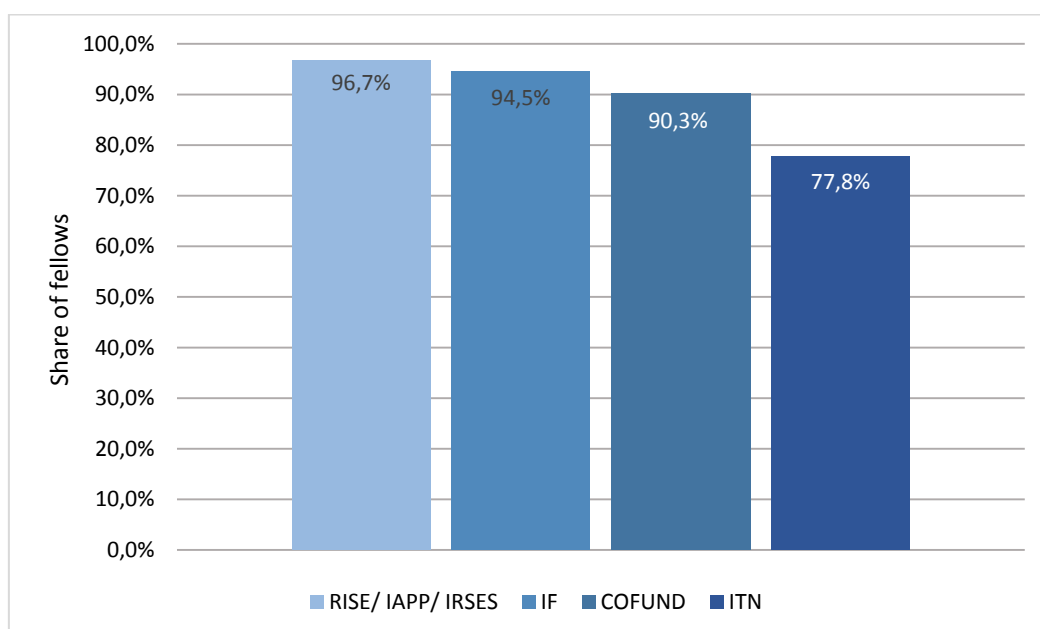
4.1.1.3 Impact on researchers' employability

The above sub-sections have shown that the majority of MSCA fellows are (very) satisfied with the training they received, that they believe they have acquired important skills, and that they were able to build sustainable networks with researchers from other organisations, including organisations abroad and/or from other sectors. The following three sub-sections look at whether these favourable conditions translate into high levels of employability (international, cross-sectoral, interdisciplinary), above average career development and excellence.

4.1.1.4 Overall employability

The share of fellows indicating that they were employed (or self-employed) was above 90% for COFUND, around 95% for IFs and over 95% for RISE/ IAPP/ IRSES¹⁴⁶. The share of former ITN fellows in employment is lower. This difference may stem from a certain level of voluntary unemployment among recent ITN fellows having completed their PhDs and waiting for a well matching job offer.¹⁴⁷ It is relatively normal for PhDs to take some time looking for a job in academia or other sectors before they accept a job offer, and active negotiations with (in particular academic) employers can be lengthy and delay entry into employment. The comparatively lower share of past ITN fellows in employment could also stem from some not looking for employment because they are still working on their PhD thesis after their MSCA fellowship has finished (i.e. they are still in education and training which was not an option in the survey. They do not have a job, but may not be "looking for a job", which is a requirement to count as unemployed in official unemployment figures).

Figure 35. Employment among fellows, by action: What is your current employment status? – share of fellows indicating to be employed or self-employed



Note: Question was only asked to respondents for which the end of the fellowship was before or equal to date "07/31/2016", allowing for a transition phase of approximately 4 months. N: COFUND=288, IF=797, ITN=837, RISE/IAPP/IRSES=598, Grand Total=2539.

4.1.1.5 Employability in other sectors

MSCA aims to initiate and promote cross-sectoral mobility throughout researchers' careers by enabling them to get exposure to workplaces in other sectors during the MSCA project. For example, over the first three years of RISE 2014-16, there were 6 510 planned secondment from academia to non-academia and 4 302 planned secondments from non-academia to academia. Moreover, around 12000 of the

¹⁴⁶ 1.8% are self-employed, 1.9% are out of the labour force and 9.1% are unemployed. For details see Annex 4.

¹⁴⁷ A transition phase from fellowship to other employment of approximately 4 months was already taken into account as this question was only asked to respondents for which the end of the fellowship was before or equal to date "07/31/2016"

approximately 27 000 fellows that have been funded under the budget of the MSCA calls for the years 2014-16 are estimated to experience some form of cross-sectoral mobility out of or into an academic setting.¹⁴⁸ There is evidence that these exposures lead to sectoral mobility after the end of the MSCA project: 11% of MSCA fellows mainly hosted in the academic sector during their fellowship moved to the non-academic sector after the end of the fellowship (RISE/IAPP/IRSES: after terminating employment with the sending organisation), and 7.1% moved from the non-academic sector to the academic sector (Table 19). Cross-sectoral mobility after the end of the fellowship is particularly high under ITN and RISE and predecessors – the two actions with an emphasis on fostering cross-sectoral collaboration. As can be seen in Table 20, 38% of the fellows who moved to the non-academic sector and half of the fellows who moved to the academic sector attribute this change to a (very) great extent to participation in MSCA.

Table 19. Share of respondents changing sectors after MSCA fellowship/after leaving the sending organisation (RISE/IAPP/IRSES), by action

First employment after the MSCA fellowship/leaving the sending organisation	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
was associated with a move from academia to the non-academic sector (e.g. industry) (only those whose main host institution/employer was a HEI or RES)	6.8%	5.3%	19.3%	27.9%	11.0%
was associated with a move from non-academic sector (e.g. industry) to academia (only those whose main host institution/employer was not a HEI or RES)	n/a	2.0%	15.4%*	22.7%*	7.1%
N (base to which share refers to): fellows with main host institution/employer HEI or RES	369	659	419	104	1 551
N (base to which share refers to): fellows with main host institution/employer private or public or not-for-profit organisations	43	50	26	22	141

*based on a low number of observation (<30).

Table 20. Responses by action (only fellows): To what extent was [move to other sector] the result of MSCA support? (share stating "to a (very) great extent")

To what extent was this the result of MSCA support? (share stating "to a (very) great extent")	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
move from academia to the non-academic sector (e.g. industry)	42.9%	27.8%	37.1%	48.6%	38.0%

¹⁴⁸ Staff Working Document on MSCA, version 6 April, made available to evaluation team.

move from non-academic sector (e.g. industry) to academia	33.3%	46.2%	48.6%	53.3%	48.5%
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Apart from first employment after the MSCA fellowship, the survey of fellows also collected data on the current sector of employment as an indicator of the extent to which former MSCA fellows are mobile across sectors. Moreover, this indicator benefits from the availability of information from a comparison group of researchers.

Table 21 suggests that higher proportion of MSCA fellows than comparable researchers (comparison group) work in the private sector (10.8% versus 1.6%). In particular ITN and RISE and predecessors are very successful in facilitating cross-sector mobility.¹⁴⁹

Table 21. Responses by type of action and comparison group (only fellows): What is your current sector of employment?

What is your current sector of employment?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total	Comparison group
Higher education institution	51.2%	60.0%	39.3%	46.8%	50.3%	67.8%
Research organisation	35.2%	31.3%	37.9%	20.2%	33.5%	25.5%
Civil society organisations / not for profit organisations	1.2%	0.4%	1.0%	0.9%	0.8%	0.3%
Private for profit – large company	3.5%	2.2%	8.9%	11.0%	5.4%	1.1%
Private for profit – Small or medium-sized company	1.6%	2.0%	9.7%	11.9%	5.4%	0.7%
Public body or other public sector organisation	6.6%	3.7%	2.6%	6.4%	3.9%	4.0%
International organisation	0.8%	0.4%	0.6%	2.8%	0.7%	0.6%
Total	100%	100%	100%	100%	100%	100%
N	256	732	626	109	1 723	4 213

Note: For RISE/IAPP/IRSES, only fellows who were no longer employed at the sending organisation at the time of the survey are included.

4.1.1.6 Employability in other fields

Over half of MSCA fellows report to have acquired knowledge and skills in interdisciplinary techniques to a (very) large extent during the fellowship and there is evidence that these skills are valued by employers from other fields after the

¹⁴⁹ Please note that the figures for RISE refer to individuals who change employers after the fellowship (i.e. who leave the former sending organisation). Those RISE fellows who remain in their jobs are not included.

fellowship: One in four MSCA fellows moves to a new field of research as part of the first employment after the fellowship (Table 22), and more than half of them believe that this is to a (very) great extent the result of participating in MSCA (Table 23). Similarly to cross-sectoral mobility, the share of fellows who move to a new field of research after the end of their fellowship is particularly high in ITN and RISE/IAPP/IRSES. This finding suggests that, in line with one of its core objectives, the MSCA programme is effective in stimulating cross-fertilisation of knowledge across fields.

Table 22. Share of respondents changing fields of research after MSCA fellowship/after leaving the sending organisation (RISE/IAPP/IRSES), by action

First employment after the MSCA fellowship/leaving the sending organisation	COFUND	IF	ITN	RISE/IAPP/IRSES	Total
was associated with a move to a new field of research	18.4%	19.8%	26.8%	38.8%	23.3%
N (base to which share refers to)	412	753	773	129	2 067

Table 23. Responses by action (only fellows): To what extent was [move to new field of research] the result of MSCA support? (share stating "to a (very) great extent")

To what extent was this the result of MSCA support? (share stating "to a (very) great extent")	COFUND	IF	ITN	RISE/IAPP/IRSES	Total
move to a new field of research	57.5%	58.6%	48.5%	59.2%	54.1%

4.1.1.7 Impact on researchers' international mobility and interdisciplinarity

International mobility

Fostering researchers' international mobility – not only during MSCA but throughout the career – is an important objective of MSCA. The bibliometric analysis of the affiliations of MSCA fellows and the comparison group of researchers shows that MSCA fellows are much more internationally mobile throughout their career, in particular IF fellows (Table 24). Over the past 10 years, one third of IF fellows have changed their country of employment at least twice, compared to 1 out of 10 researchers in the comparison group. For ITN fellows, the level of international mobility measured over this period is lower.

Table 24 also shows that the ratio of institutional level mobility to international mobility is higher for the comparison group researchers (≈ 3) than for IF and ITN fellows (≈ 2). This indicates that mobility of non-MSCA researchers tends to be within countries, while MSCA fellows are much more likely to take up new positions in another country.

Table 24. Researcher mobility at country and institution-level, MSCA fellows and comparison group

Mobility indicator	MSCA-IF	Comparison group IF	MSCA-ITN	Control group ITN	Overall MSCA	Overall comparison group
Researcher mobility at country-level over the period 2007-2016 (at least two cross-border moves)	32.7%	10.3%	10.8%	9.6%	18.7%	9.3%
Researcher mobility at institution-level over the period 2007-2016 (at least two moves)	58.8%	32.7%	21.9%	30.4%	33.8%	30.6%

Source: Elsevier bibliometric analysis. Note: The shares relate to fellows who have been mobile at least twice, taking into account that one move of MSCA fellows may be induced by MSCA mobility requirements.

Interdisciplinarity

Interdisciplinary research is often believed to have great potential to contribute to research breakthroughs, address societal problems, and foster innovation. Against this background, in particular ITN emphasises the need for interdisciplinary research programmes and there are indications that the interdisciplinary dimension of MSCA is indeed substantial: According to a keyword analysis carried out by REA on the IF Calls 2014 and 2015 30% of MSCA-IF proposals include multidisciplinary research.

Underpinned by corresponding training modules, MSCA projects with an interdisciplinary dimension are expected to provide a direct contribution to the proportion of interdisciplinary research in Europe as well as equipping early-stage researchers with the skillset and tools needed to conduct interdisciplinary research in the future.

Table 25 sheds light on how MSCA fellows' interdisciplinarity of research output compares to that of the average researcher and a comparison group. The bibliometric analysis performed to generate these statistics is based on the principle that articles are likely to be interdisciplinary if they cite papers that are "far away" from each other in terms of the similarity of the journals they appear in (based on how often those journals are cited together in a certain period). By contrast, if articles cite papers in journals that are cited together very frequently, they are likely to be monodisciplinary. Using this methodology to assess the interdisciplinarity of researchers' research output shows that in particular research of ITN fellows tends to be interdisciplinary to a higher extent than research of the average researcher: between 2007 and 2016 9.3% of publications of ITN fellows were interdisciplinary, against 8.9% of publications of the ITN comparison group and a world average of 8.5%. The table also indicates that research of IF fellows tends to be less interdisciplinary than both research of the IF comparison group and the world average.

Table 25. Interdisciplinarity of research output over the period 2007-2016, MSCA fellows versus comparison group and world average

Indicator	MSCA-IF	Comparison group IF	MSCA-ITN	Comparison group ITN	Overall MSCA	Overall comparison group	World average
Interdisciplinary publication share of total over the period 2007-2016	6.8%	7.8%	9.3%	8.9%	8.2%	8.1%	8.5%

Source: Elsevier bibliometric analysis

4.1.1.8 Impact on career development

The previous sub-section focused on the ability of MSCA fellows to find employment after the fellowship. However, highly skilled and talented researchers have much higher aspirations than “simply” finding employment. The MSCA programme not only aims to offer attractive working conditions during the fellowship, but intends to contribute to fellows’ successful further career, and to support them in finding attractive working conditions.

In addition to the current employment status, the survey therefore asked fellows whether they currently have a permanent position/ open ended contract – an important indicator of employment security. Table 26 indicates that the majority of past fellows are employed on fixed term contracts.

Table 26. Responses by action (only past fellows): What is your current employment contract?

What is your current employment contract?	COFUND	IF	ITN	RISE/IA PP/IRSES	Total
Fixed term <1 year	13.3%	8.3%	29.7%	15.7%	17.3%
Fixed term 1-2 years	21.0%	12.8%	32.4%	17.6%	21.5%
Fixed term 2-4 years	18.5%	16.9%	16.8%	16.7%	17.1%
Fixed term >4 years	8.1%	8.9%	2.1%	7.4%	6.2%
Permanent/ open ended	35.8%	50.1%	16.0%	38.0%	34.8%
Other, please specify	3.3%	3%	3.2%	4.6%	3.2%
Total	100%	100%	100%	100%	100%
N	271	733	627	108	1 739

Note: For RISE/IAPP/IRSES, only fellows who were no longer employed at the sending organisation at the time of the survey are included.

There is evidence that participation in the MSCA programme helps some researchers to find a permanent position (Table 27). Of the 21% of MSCA fellows who moved to a permanent position after their MSCA fellowship, more than half (56%) report that this was to a large or very large extent the result of MSCA support.

Table 27. Responses by action (only fellows): To what extent was the move to a permanent position after the MSCA fellowship the result of MSCA support?

To what extent was the move to a permanent position after the MSCA fellowship the result of MSCA support	COFUND	IF	ITN	RISE/IAPP/IRSES	Total
To a very great extent	31.0%	32.0%	25.0%	16.7%	28.9%
To a great extent	21.4%	31.0%	24.1%	23.3%	26.8%
To a moderate extent	19.1%	18.2%	17.9%	33.3%	19.4%
To a small extent	10.7%	5.9%	8.0%	10.0%	7.7%
Not at all	15.5%	10.8%	18.8%	16.7%	14.2%
Don't know	2.4%	2.0%	6.3%	0.0%	3.0%
Total	100%	100%	100%	100%	100%
N	84	203	112	30	429

The assignment also looked at the development of research careers of MSCA fellows beyond (secure) employment.

Those MSCA fellows who indicated that they moved to a higher career stage since the end of the fellowship (819 out of 4 009) were asked to what extent they believed they would have attained the subsequent career stage (e.g. R3 for most of IF fellows) in the absence of participation in MSCA. This question was not asked to former ITN fellows as they will by definition attain the next career stage (R2 – PhD holders) after completing the fellowship and receiving their doctorate.

Table 28 presents evidence that the MSCA programme is effective in boosting the career of researchers. One in ten fellows who attained the subsequent career stage believes that he or she would not have attained this career stage otherwise. Half of fellows who attained the subsequent career stage believe that it would have taken them more time without MSCA. One in five fellows believes that he or she would have attained the subsequent career stage in a similar timeframe.

Table 28 also suggests that the MSCA programme's effectiveness in progressing the career of fellows is higher for COFUND and IF than for RISE/IAPP/IRSES, reflecting the different nature and objectives of these actions.

Table 28. Responses by action (only fellows): Do you believe that you would have attained the subsequent career stage after the end of your fellowship without participating in MSCA?

Do you believe that you would have attained the subsequent career stage after the end of your fellowship without participating in MSCA?	COFUND	IF	RISE/IAPP/IRSES	Total
Would not have attained subsequent career stage at all	7.8%	12.4%	4.8%	9.8%
Would have taken more time to attain subsequent career stage	50.0%	57.8%	37.0%	51.5%

Would have attained subsequent career stage in a similar timeframe	18.2%	16.0%	33.9%	20.5%
Would have attained subsequent career stage faster	2.6%	1.5%	6.9%	2.9%
Don't know	21.4%	12.4%	17.5%	15.3%
Grand Total	100.0%	100.0%	100.0%	100.0%
N	154	476	189	819

Note: This question was not asked to former ITN fellows as they will by definition attain the next career stage (R2 – PhD holders) after completing the fellowship and receiving their doctorate.

38% of respondents moved to a more senior position after their MSCA fellowship. Two thirds of these fellows attribute this career progression to a (very) great extent to participation in MSCA. Only 10% perceive the MSCA programme to only have had a small or no effect at all on their career progression immediately after the fellowship. Again, the positive effect seems slightly larger for COFUND, IF and ITN than for RISE (the share of respondents attributing the move to a senior position to MSCA to a very great extent is higher).

Table 29. Responses by action (only fellows): To what extent was the move to a more senior position after the MSCA fellowship the result of MSCA support?

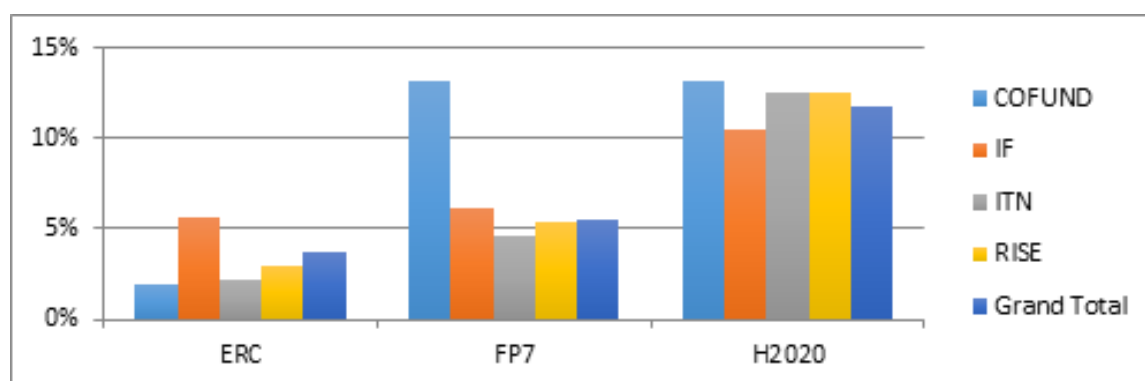
To what extent was the move to a more senior position after the MSCA fellowship the result of MSCA support	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
To a very great extent	29.3%	37.8%	27.6%	19.3%	31.6%
To a great extent	34.7%	36.6%	34.0%	33.3%	35.2%
To a moderate extent	19.3%	15.4%	21.6%	38.6%	19.8%
To a small extent	5.3%	3.9%	4.8%	5.3%	4.6%
Not at all	8.0%	4.2%	7.6%	3.5%	6.0%
Don't know	3.3%	2.1%	4.4%	0.0%	2.9%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%
N	150	331	250	57	788

Furthermore, MSCA grants seem to have a noticeable effect in helping researchers to 'move on' into other elite programmes focussing on later career stages. Winning prestigious follow up funding can be seen as one possible indicator of possible career progression. Over 10% of participants in each of the MSCA projects (NIGHT not included) reported that participation had helped them acquire H2020 funds.¹⁵⁰ The

¹⁵⁰ Survey question was only asked to fellows of completed projects.

evaluation survey also looked specifically at ERC funding. Figure 36 shows that in particular IF fellows reported that participation in MSCA had helped them in the acquisition of ERC funds –although to a lower extent than other H2020 funds.¹⁵¹

Figure 36. Extent to which participation in MSCA has helped beneficiaries to acquire FP7/ H2020 funds



Source: ICF survey of beneficiaries. N= 2970 (COFUND= 53; IF= 1127; ITN= 1 031; RISE/IAPP/IRSES= 759). Other programmes include charities, philanthropic, industry, etc.

MSCA fellows also tend to have a slightly higher success rate in winning ERC funding than non-fellows. An analysis of ERC applicants under Horizon 2020 who were MSCA fellows in FP7 suggests that their average success rate is around 16%, compared to 12% for all applicants to the same calls for proposals.¹⁵² ERC success rates were particularly high for researchers who had been CIG fellows (23%) or IRG fellows (21%) in FP7.

4.1.1.9 Impact on researchers' excellence

There is strong evidence that MSCA fellows are excellent and that they are growing into their role as the next generation of leading researchers.

The bibliometric analysis performed as part of this assignment allows for two types of comparisons.

- First, it allows to compare the quality of publications of MSCA fellows against the world average (i.e. the average researchers);
- Second, it allows to compare the quality of publications of MSCA fellows against a comparison group of successful, established, high profile researchers. This comparison group has been constructed based on the similarity of the content of publications using the Scopus database.¹⁵³ With regard to MSCA's objective

¹⁵¹ Only 17% of respondents (varying from less than 15% for COFUND and IF to 22% of respondents from RISE) reported that MSCA participation had had no effect of the acquisition of additional funds, although a high proportion (50% on average) reported that it was too early to tell or did not know.

¹⁵² For this analysis the study team reviewed ERC applicant data from the following calls for proposals: ERC-2014-ADG, ERC-2014-CoG, ERC-2014-PoC, ERC-2014-STG, ERC-2015-AdG, ERC-2015-CoG, ERC-2015-PoC, ERC-2015-STG, ERC-2016-ADG, ERC-2016-COG, ERC-2016-PoC, ERC-2016-STG, ERC-2017-STG. Out of 22,784 eligible applicants overall, 1,591 (around 7%) were MSCA fellows in FP7. For a previous analysis with similar results see: Economisti Associati, Marie Curie researchers and their long-term career development: a comparative study – Final Report, March 2014. P.110.

¹⁵³ The method used for creating the comparison group of researchers makes for this comparison group to consist of strong, leading researchers in their field as it favours authors

of supporting and developing the next generation of leading researchers, this group can be considered a benchmark of excellence.

Table 30 shows that MSCA fellows are about twice as likely as the average researcher to have publications that belong to the Top 1%, Top 5% and Top 10% of cited publications.

Table 30. Quality of publications 2015, MSCA fellows versus comparison group and world average

Indicator of excellence	MSCA-IF	Comparison group IF	MSCA-ITN	Comparison group ITN	Overall MSCA	Overall comparison group	World average ¹⁵⁴
Top 1% cited publication share of total output 2015	2.4%	2.4%	2.0%	3.0%	1.9%	2.3%	0.8%
Top 5% cited publication share of total output 2015	11.6%	11.1%	10.6%	12.8%	10.2%	10.9%	4.7%
Top 10% cited publication share of total output 2015	22.3%	20.7%	17.6%	20.0%	19.7%	20.3%	10.0%

Source: Elsevier bibliometric analysis based on Scopus (2017). Note: In order to achieve a similar level of seniority of MSCA fellows and the comparison group, only researchers with their first Scopus publication 2006 or later were selected for the bibliometric analysis. This approach was chosen as researchers in the overall comparison group sample (first publication 1996 onwards) tended to have (much) higher seniority than researchers in the sample of MSCA fellows. At the time of the analysis, 2016 data was still incomplete and therefore instable. Reported figures are therefore 2015 data.

Table 30 also shows that compared against the comparison group of established, high profile researchers, MSCA fellows overall published slightly less well in 2015. An exception are IF fellows, who partly performed better than this high-performing comparison group.

with a higher publication output and, presumably, a higher citation impact: Each MSCA-funded research proposal is analysed by various natural-language processing techniques to find a set of keywords that accurately describe the proposal's contents. These keywords are then used to find similar publications with similar keywords in the Scopus database. The authors of the papers thus found are ranked according to an algorithm that takes into account the number of matching publications and the share of matching publications relative to the authors' total output (among other things). After these authors are ranked, the highest ranking authors are selected for inclusion in the peer group. Therefore, because the algorithm favours authors with a higher number of matching publications, it is likely those with the highest ranking will have a higher-than-average publication output and impact.

¹⁵⁴ The bibliometric analysis is based on three types of documents: academic articles, reviews and conference papers. As there may be other types of documents among the Top 1%/5%/10% cited publications, the world average can be below 1%/5%/10%.

In summary, the bibliometric analysis of fellows' excellence in research indicates the following:

- IF fellows have an excellent profile with regard to their publication output. They perform up to three times as well as the average researcher, for example with regard to Top 1% cited publications (2.4/0.8). IF fellows out-perform the comparison group of successful, established, high profile researchers on important indicators of excellence (i.e. Top 5% and Top 10% cited publication share of total output);
- ITN fellows also have an excellent publication profile and are more than twice as successful in producing Top 1% and Top 5% cited publication as the average researcher. They perform less well than the comparison group, in particular regarding the Top 1% cited publication share of total output. A possible explanation for this finding is that the ITN comparison group may be more academically-oriented: In line with the programme's objectives, private sector involvement in ITN was enhanced during FP7 by making it an evaluation criteria in the selection of projects for funding. ITN projects under FP7 and Horizon 2020 therefore often have very applied components, the results of which tend to be more difficult to publish in highly cited journals. This explanation is supported by the findings presented in Table 31, showing that ITN fellows are much less likely than IF fellows to produce peer-reviewed publications as part of their fellowship. With regard to the latter, it should also be noted that, through its construction, the comparison group of researchers similar to ITN fellows is slightly more senior on average, which may also provide the comparison group with a slight advantage with regard to the quality of publications and their impact;
- The bibliometric analysis of excellence of COFUND and RISE/IRSES/IAPP fellows (not shown here) shows that they perform better than the average researcher. COFUND fellows perform similar to IF fellows and are up to three times as likely as average researchers to produce top-cited publications. RISE/IRSES/IAPP fellows are 1.7 times as likely as the average researcher to produce top-cited publications. For both COFUND and RISE/IRSES/IAPP fellows a meaningful comparison with a comparison group is not possible due to a relatively low number of observations (COFUND) and a very diverse profile of RISE/IRSES/IAPP fellows compared to a rather academic-oriented comparison group.

4.1.1.10 Direct and indirect outputs and results achieved by MSCA fellows

MSCA is the H2020 programme part with the highest number of publications in peer-reviewed journals¹⁵⁵, and the findings from the survey of fellows show that peer-reviewed publications are indeed the most common tangible output of MSCA fellowships. As shown in Table 31, the share of MSCA fellows who produced this type of output is highest in COFUND and IF (more than 80%, note that fellows in the COFUND sample are almost all ER). ITN has the lowest publication rate, which may partly stem from the applied focus of many of the ITN projects involving industry participation.

¹⁵⁵ H2020 KPI 2 based on data from project reporting. Publications in peer-reviewed journals reported by MSCA fellows amounted to 740, followed by 664 reported by ERC grant holders and 430 reported by holders of LEIT-ICT grants. This compares to 3 246/2 240/1,005 MSCA/ERC/LEIT-ICT grants signed and EUR (million) 2 115/3,874/2,601 EC funds allocated.

Results of MSCA projects tend to fall between Technology Readiness Levels (TRL)¹⁵⁶ of “basic research” (TRL 1) to “small scale prototypes” (TRL 4), broadly in line with the focus of the programme on researcher mobility and training.

Corresponding to the low TRL of project results, only a small share of fellows report to have applied for patents (5.1%) or Intellectual Property Rights (IPR, 1.4%) as a result of their fellowship.

Fellows’ responses presented in Table 31 also indicate that a substantial share of fellows output is produced with researchers with whom new collaborations have been built during the MSCA fellowship.

Table 31. Responses by action (only fellows): Did you produce the following outputs during your MSCA fellowship/as a result of your RISE/IAPP/IRSES staff exchange?

Did you produce the following outputs during your MSCA fellowship/as a result of your RISE/IAPP/IRSES staff exchange?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Peer-reviewed publications	84.7%	82.8%	56.6%	71.5%	69.6%
Patent applications	6.1%	6.7%	3.6%	5.9%	5.1%
IPR applications (Trademark, registered design, other forms of IPR)	1.4%	1.8%	0.8%	2.6%	1.4
<i>Did you produce the following outputs as a result of new collaborations during your MSCA fellowship?</i>					
Peer-reviewed publications	72.4%	72.3%	43.7%	65.5%	57.9%
Patent applications	3.8%	4.3%	1.5%	4.1%	2.9%
IPR applications (Trademark, registered design, other forms of IPR)	1.2%	1.3%	0.6%	3.1%	1.2%

The box below provides an illustrative example of an IF fellow’s output and direct contribution to research.

Box 1: A new standardised protocol for the microbial electro-synthesis process (MES) developed by an IF fellow

The BIO-ELECTRO-ETHYLENE project at the Flemish Institute for Technological Research (VITO) aimed at developing new processes for the production of ethylene, a biofuel. The IF fellow developed a new standardised protocol for the microbial electro-synthesis process (MES). This novel methodology is still used by researchers in VITO’s R&D department today and is considered one of the most important outcomes of the project by all researchers involved. Apart from its use in VITO’s laboratories, the new methodology was later published and supported the publication of other reviews and book chapters in highly reputed journals and books. As such, the development of this protocol not only impacted the work of VITO’s R&D department but also contributed to the good reputation of the research

¹⁵⁶ https://en.wikipedia.org/wiki/Technology_readiness_level#European_Commission_definition

team.

Source: Case study on Bio-Electrochemical Production of Ethylene through CO₂ sequestration (BIO-ELECTRO-ETHYLENE), Belgium

4.1.1.11 Unexpected and unintended effects of MSCA participation at the individual level?

Fellows' expectations of MSCA participation are high and the objectives of the programme are clear. As a result, only few fellows and coordinators report unexpected or unintended effects of MSCA participation. Most of those who do, report positive unexpected effects, such as the award of a prestigious follow-up grant or better than expected collaboration with project partners.

Most importantly for this evaluation assignment, some ITN coordinators are concerned about the quality of their ESR's scientific output and possible delays in completing the PhD thesis given their intense training programme. This points to a possible, unintended trade-off between providing ESRs with exceptional training and secondment opportunities on the one hand, and ensuring that ESRs have sufficient time and continuity in the work-flow to achieve excellent scientific results on the other hand. ITN consortia's challenge in successfully combining these two aims without compromising one or the other is very well summarised in the following survey comment of an ITN coordinator:

"During the contract negotiations with the EU it was recommended that two secondments are arranged for each ESR. However, the ESRs spent a great deal of time on having to organise and complete these secondments. Besides also spending time on settling in a new country, the extraordinary intense training programme (network events, conference participation etc.) added extra pressure on them and took valuable time from concentrating on their individual research project, making great results for great publications. [...] From the day they receive their PhD degree [...] the MSCA fellows compete with other PhDs who have had more time to create publishable scientific results."

Although these concerns are only expressed by a minority of ITN coordinators, the existence of such a trade-off merits special attention during project proposal evaluation (is the proposed training programme feasible?) and the implementation process (providing organisations with advice on how to reconcile intensive training with the availability of sufficient time for producing high quality research output within three years).

4.1.1.12 Negative and positive factors influencing the achievements observed at the individual level

Achievements observed at the individual level can be expected to vary with the extent to which fellows were able to benefit from the fellowship in terms of access to quality training and the development of relevant skills. Analysing data collected through the survey of fellows by means of regression analysis, the following statistically significant associations emerge:

- **Satisfaction with training** is positively associated with the volume of annual training followed: on average, fellows who followed training for more days per year are more satisfied with their training during the fellowship.
- **Skills improvement:** the volume of training followed during the fellowship is positively related with the level of improvement of entrepreneurial skills and

scientific and research-related skills.¹⁵⁷ No such association was found for improvement of managerial skills nor skills and knowledge particularly relevant for the academic sector.

- **Employment:** MSCA fellows who are more satisfied with the training followed during their fellowship are less likely to be unemployed. There is no association between the amount of training followed and fellows' employment status. There is also no association between the training received during the fellowship (both in terms of volume and fellows' satisfaction with the training) and whether past fellows are holding a permanent position.
- **Career progress** (comparing the current career stage with the career stage at the beginning of the MSCA fellowship) is positively associated with satisfaction with the training activities followed. Career progress is also positively associated with the extent to which fellows report to have developed entrepreneurial skills and management skills, indicating the importance of these skills for career progression.
- Further to the findings above, regression analysis did not show statistically significant relationships between gender and skills improvement, employment and career progression, indicating that female MSCA fellows do not experience any disadvantages with regard to these outcomes vis a vis their male counterparts.

4.1.2 The impact of MSCA on organisations

At the organisational level, MSCA is expected to foster the improvement of training and working conditions and career development opportunities for researchers in order to improve the attractiveness of the researcher profession and to foster talent. At the same time, participation in MSCA is expected to increase the research capacity of organisations.

4.1.2.1 Impact on the provision of training for (MSCA) researchers in general

About half of the organisations which responded to the survey state that participation in MSCA has led or will lead to improvements to a (very) large extent in the quality of training provided to researchers and 30% report a small or moderate impact (Table 32). 8.4% of organisations which responded to the survey report no improvements because good measures had already been in place before MSCA participation. Only a small minority of organisations (3.2%) report that MSCA participation has not led/will

¹⁵⁷ Survey respondents could indicate to what extent they acquired skills in more than 22 areas during their MSCA fellowship. To facilitate the interpretation of the results, a factor analysis was carried out to group skills. This analysis identified four factors/groups of skills. The first factor relates to **entrepreneurial skills**: i) Knowledge of Intellectual Property Rights (IPR), ii) Entrepreneurship, iii) Product development, iv) Intellectual property rights, v) Marketing and sales, vi) Human resource management, leadership and line management.

The second factor relates particularly to **scientific and research-related skills**: i) New and/or advanced scientific methods or knowledge/ expertise in your research field; ii) Knowledge of other research disciplines; iii) Interdisciplinary techniques, iv) Use of specialised equipment.

The third factor includes **managerial skills**: i) Grant and proposal writing; ii) Project management, iii) Team management and leadership skills, v) Presentation skills, public speaking and communication, vi) Event organisation (e.g. seminar, conference, science festival).

The fourth factor is to some extent similar to the third – high loadings on Project management, Team management and leadership skills – but also includes **skills and knowledge particularly relevant for the academic sector** – namely i) Research ethics, ii) Research data management, iii) Open science- as well as iv) Gender aspects.

not lead to improvements in the quality of training provided to researchers although no good measures have already been in place.

Table 32. Responses by action (only organisations): To what extent has/will your participation in the MSCA programme led/lead to improvements in the following areas: Quality of training for researchers

To what extent has/will your participation in the MSCA programme led/lead to improvements in the following areas: Quality of training for researchers	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Grand Total
To a very large extent	24.5%	18.8%	16.0%	9.9%	15.7%
To a large extent	35.8%	33.5%	35.9%	38.1%	35.6%
To a moderate extent	7.5%	17.6%	21.3%	26.9%	21.1%
To a small extent	3.8%	8.2%	9.8%	9.4%	9.0%
Not at all (already good measures in place)	13.2%	9.7%	8.2%	6.3%	8.4%
Not at all (the programme did not have an effect)	5.7%	3.1%	3.0%	3.6%	3.2%
Don't know	7.5%	5.3%	3.6%	3.6%	4.3%
Not answered	1.9%	3.8%	2.1%	2.4%	2.8%
Total	100%	100%	100%	100%	100%
N	53	1127	1031	759	2 970

This evidence of the impact of organisations' MSCA participation on the quality of training provided to researchers is corroborated by fellow's satisfaction with the quality of training offered to them: 68% of the MSCA fellows who responded to the survey are (very) satisfied with the quality of training they were offered. This compares to 59% of researchers in the comparison group (not shown here).

The share of organisations providing formal or informal training in various skills areas is presented in Figure 37. It shows that the skills areas where more fellows report large improvements (Figure 34) are also those areas where more organisations provide training. In the framework of this evaluation it is not possible, however, to assess whether fellows' skill acquisition is a function of the provision of training by organisations, or whether the provision of training by organisations has been shaped by fellows' demand for training in certain skills areas.

The following observations can be made in relation to the provision of training by organisations:

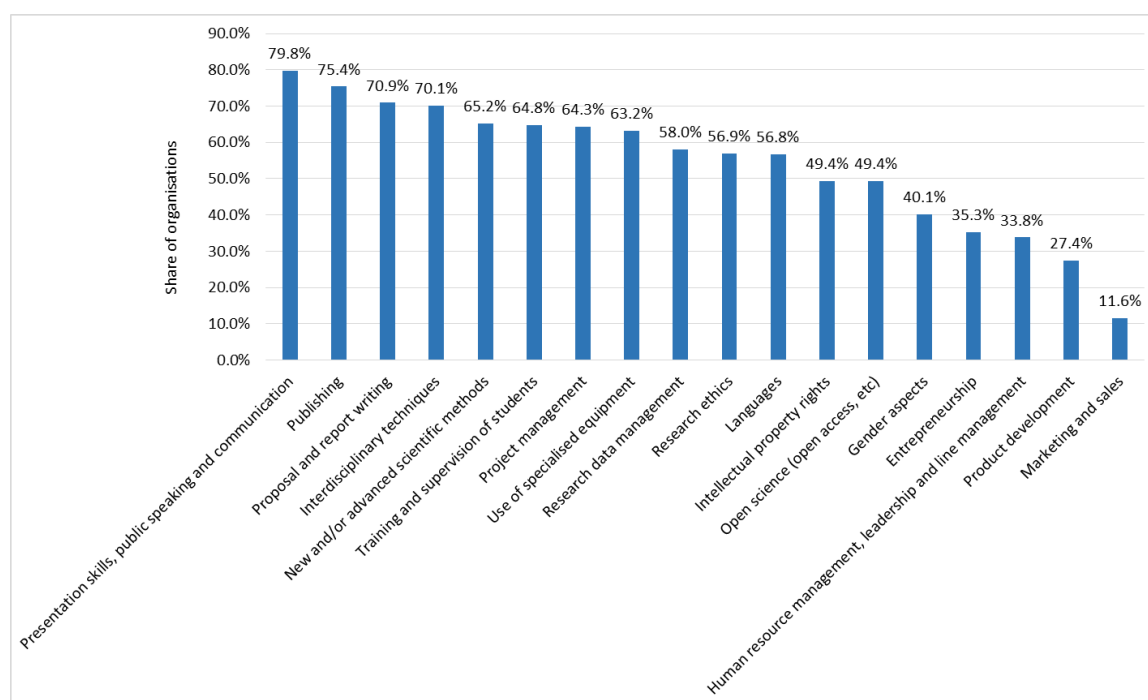
- Skills areas directly related to conducting research and communicating its findings are best covered. Between half and three quarters of organisations surveyed offered researchers training on, for example, the presentation of

research, publishing, advanced scientific methods, but also project management skills and research ethics.

- Training on the H2020 cross-cutting issues gender aspects and open science are less often provided than on skills areas directly related to conducting and communicating research, but nevertheless are provided by more than 40% of organisations.
- Differences between actions exist, mainly reflecting main objectives: ¹⁵⁸
 - Organisations' coverage of areas of training tends to be better in ITN than IF, in particular in relation to training on advanced scientific methods, the use of specialised equipment and skills areas related to bringing research to the market, such as intellectual property rights, entrepreneurship, product development and marketing and sales. In line with the higher career stage of IF fellows, a higher share of IF organisations offers training on the supervision of students, project management and human resources.
 - Training provided by RISE/IAPP/IRSES organisations follows a more 'applied' profile, with on the one hand training on new and advanced scientific methods being provided by only 6% of organisations, and on the other hand an above average share of organisations providing training on, e.g., interdisciplinary techniques, the training and supervision of students, the use of specialised equipment, research data management and product development.
 - In areas of training directly related to conducting and communicating research, coverage of training provided by COFUND organisations is structurally lower than within IF and ITN. By contrast, with regard to the provision of training on H2020 cross-cutting issues such gender aspects, open science, as well as entrepreneurship and intellectual property rights COFUND organisations perform above average. This finding corresponds with the statements of key informants interviewed as part of the case studies, who report that the European Commission has been very effective in emphasising the relevance of these issues in the process of negotiating the conditions for the COFUND funding support. As part of the Hermes project, for example, additional standards relating to ethical aspects have been included as evaluation criteria in the fellow selection process.

¹⁵⁸ For a more detailed presentation of the share of organisations providing formal/informal training by action, please see Annex 4.

Figure 37. Share of organisations providing formal/informal training (%), sorted by total share



Note: For RISE/IAPP/IRSES, only organisations who provided/ provide training as part of the staff exchange were asked to respond to this question. N=2 682.

19% of organisations report that the introduction of formal or informal training was to a (very) large extent the result of participation in MSCA as shown in Table 33. Overall, however, the impact of MSCA participation on the provision of training is small to moderate, and 25% of organisations report that the training they provide had already been introduced before participation in MSCA.

Table 33. Responses by action (only organisations): To what extent has/will formal or informal training in these areas been introduced/be introduced as a result of your organisation's participation in MSCA?

To what extent has/will formal or informal training in these areas been introduced/be introduced as a result of your organisation's participation in MSCA?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
To a very large extent	4.4%	3.1%	4.1%	5.3%	3.9%
To a large extent	23.9%	8.9%	16.3%	26.3%	15.2%
To a moderate extent	26.1%	22.0%	27.2%	36.2%	26.7%
To a small extent	23.9%	21.6%	24.2%	12.2%	20.9%
Not at all (training had already been introduced)	13.0%	33.3%	22.4%	12.8%	25.0%
Don't know	8.7%	11.2%	5.8%	7.2%	8.3%

To what extent has/will formal or informal training in these areas been introduced/be introduced as a result of your organisation's participation in MSCA?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Total	100%	100%	100%	100%	100%
N	46	1 070	1 012	475	2 603

The survey results suggest that in the vast majority of cases, MSCA fellows tend to follow training that had most likely already been introduced before the organisations' participation in MSCA, and that is also followed by other researchers in the institution. However, between 10 and 20% of organisations state that they provide training exclusively to MSCA fellows.¹⁵⁹ Overall, the share of exclusive training seems to be lowest in IF and highest in RISE/IAPP/IRSES, suggesting –in line with the results presented in Table 33 – that MSCA's impact on training provision is highest in RISE/IAPP/IRSES and lowest in IF. With regard to training content, MSCA fellows are most often offered exclusive training in product development (% of organisations offer exclusive training in this area), marketing and sales (20%), and entrepreneurship (17%).¹⁶⁰

The case studies also show how the MSCA fellows bring valuable knowledge to the hosting research group. The research group that hosted the IF fellow as part of the BIO-ELECTRO-ETHYLENE project was a small team of researchers, postdocs and PhD candidates. Given the small size of the team, the presence of the fellow also offered the PhD candidates further support and guidance, and opportunities for collaborating and exchanging ideas. This was particularly true for one PhD candidate who was using the same technical process as the fellow. The fellow also contributed to the wider teaching offered by the research institute, supervising 3 masters' and bachelors' theses working in conjunction with the research institute.

4.1.2.2 Impact on doctoral training (only ITN)

The provision of excellent doctoral training is one of the main objectives of the MSCA Initial Training Networks for ESR. This evaluation therefore collected specific data from ITN fellows, ITN organisations and a comparison group of researchers to be able to assess whether this objective has been met.

4.1.2.3 Comparison of supervision conditions ITN and comparison group of researchers.

The (perceived) quality and amount of doctoral supervision received does not differ between ITN fellows and researchers in the comparison group, as shown in Table 34. It needs to be recalled at this point that the comparison group consists of very successful researchers with peer-reviewed publications similar in content to those of ITN fellows. This means that by definition, researchers are excluded from the comparison group who did not succeed in publishing in peer-reviewed journals due to, for example, low quality of supervision or lack of expertise of supervisors. Consequently, the quality of supervision and expertise of supervisors can be expected to be above average for the comparison group, and thus also for ITN fellows.

¹⁵⁹ Please see Annex 4 for more detail.

¹⁶⁰ Please see Annex 4 more detailed description of the different types of training only available to MSCA fellows, by action.

Table 34. Responses ITN fellows versus comparison group of researchers: Overall, how would you rate the quality of scientific supervision during your time as a PhD candidate?

Overall, how would you rate the quality of scientific supervision during your time as a PhD candidate?	ITN	Comparison group for ITN researchers
Very Good	43.5%	44.2%
Good	28.0%	29.2%
Fair	15.0%	17.9%
Poor	8.1%	4.6%
Very poor	4.1%	4.1%
Don't know	1.4%	0.0%
Total	100%	100%
N	2 729	346

Responses ITN fellows versus comparison group of researchers: Overall, how would you rate the amount of scientific supervision during your time as a PhD candidate?

Overall, how would you rate the amount of scientific supervision during your time as a PhD candidate	ITN	Comparison group for ITN researchers
Very Good	36.8%	34.8%
Good	30.1%	29.0%
Fair	18.6%	26.8%
Poor	9.0%	3.6%
Very poor	3.8%	5.1%
Don't know	1.7%	0.7%
Total	100%	100%
N	2 723	138

4.1.2.4 Comparison of training conditions between ITN fellows and comparison group researchers

While there does not seem to be a difference in ITN fellows' and comparison group researchers' experiences with regard to supervision, ITN fellows report a higher level of satisfaction with training opportunities than comparison group researchers: Table 35 shows that the share of respondents indicating to have been (very) satisfied with the training offered is higher for ITN fellows than for the comparison group (CG) in relation to the volume of training, the areas covered and the quality of training. Table 35 indicates that the share of very satisfied researchers is similar in both groups, and that the difference between the groups most importantly stems from a higher share of ITN fellows being in the "satisfied" rather than "neutral" answer category. This suggests that MSCA participation is particularly effective in helping organisations which previously offered neither satisfying nor dissatisfying training to improve the volume and quality of training they offer, as well as its coverage.

Table 35. Comparison of satisfaction with training, ITN fellows and comparison group researchers (CG), (in%)

Overall, were you satisfied with the training offered to you?	Volume		Areas covered		Quality	
	ITN	CG	ITN	CG	ITN	CG
Very Satisfied	24.5%	28.5%	23.4%	22.9%	28.0%	31.9%
Satisfied	44.2%	31.2%	42.7%	32.6%	45.9%	33.9%
Neutral	19.3%	25.0%	21.6%	27.9%	15.9%	22.0%
Dissatisfied	7.6%	11.8%	8.0%	12.2%	5.7%	8.9%
Very dissatisfied	4.4%	3.5%	4.2%	4.5%	4.5%	3.3%
Total	100%	100%	100%	100%	100%	100%
N	2 654	345	2640	345	2 653	336

Note: not applicable omitted.

4.1.2.5 Comparison of exposure to workplaces outside of academia between ITN fellows and comparison group researchers

Exposure to industry and other relevant employment sectors is one of the Seven Principles for Innovative Doctoral Training.

53% of ITN fellows report to have had exposure to workplaces outside of academia, which is comparable to the share reported by the comparison group for ITN researchers (51%). Exposure reported by ITN fellows differs from that of the comparison group regarding the distribution of exposure across non-academic workplaces. Table 36 indicates that ITN is successful in establishing better links with industry than other doctoral training programme, shifting exposure from public sector and civil society organisations towards industry, including SMEs: 22% of ITN fellows had exposure to workplaces in large companies and 30% had exposure to workplaces in SMEs, compared to 11% and 18% respectively for the comparison group.

Table 36. Exposure to workplaces outside of academia of ITN fellows and comparison group

During your time as a PhD candidate, did you have exposure to future workplaces outside academia (choose all that apply)?	ITN	Comparison group for ITN researchers
Private for profit - large company	22.1%	11.9%
Private for profit - Small or medium-sized company	29.5%	16.3%
Public body or other public sector organisation	19.7%	32.6%
Civil society organisations / not for profit organisations	5.6%	10.8%
International organisation	12.5%	15.1%

4.1.2.6 Impact on general working conditions and opportunities for professional and career development (all MSCA)

4.1.2.7 Organisations' view

Organisations were asked to what extent MSCA participation has led/will lead to improvements at organisational level in the following areas related to fellows' career development:

- The provision of career advice for researchers
- Job placement assistance for researchers
- Regular and transparent assessment of researcher's professional performance
- Procedures for recruitment of researchers are open, transparent, and merit-based
- Procedures for career progression of researchers are open, transparent, and merit-based
- Adoption of procedures and practices recommended in the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers
- Career development for researchers

In general, between one quarter and one third of organisations report that MSCA participation has led or will lead to improvements to a (very) large extent in these areas. One area stands out: Almost half (48%) of organisations state that MSCA participation has led or will lead to improvements in career development for researchers, pointing to MSCA's importance in providing researchers with funding opportunities and with working conditions that allow them to develop their research and career.

4.1.2.8 Fellows' experience

The data collected allows for a triangulation of organisations' views on the impact of MSCA participation on various areas related to researchers' career development with information on working and career development conditions reported by fellows (and a comparison group of researchers).

Table 37 indicates that organisations participating in MSCA are indeed more often complying with the Charter and Code with regard to the openness and transparency of recruitment procedures. While 24% of MSCA fellows perceive the recruitment

procedures at the institution where they did their fellowship to be open and transparent to a very great extent, this is only 13% of researchers from the comparison group.

Table 37. Responses by action and comparison group (only researchers): At the institution where you did your fellowship/PhD, to what extent were procedures for recruitment open and transparent? (in%)

At the institution where you did your fellowship/PhD, to what extent were procedures for recruitment open and transparent?	COFUND	IF	ITN	Total MSCA	Comparison group of ESR researchers
To a very great extent	23.6%	24.7%	23.7%	24.3%	13.2%
To a great extent	28.4%	29.3%	38.6%	30.2%	29.5%
To a moderate extent	18.9%	17.8%	19.5%	18.3%	28.6%
To a small extent	8.8%	8.9%	4.3%	8.3%	14.5%
Not at all	3.9%	4.5%	0.9%	3.9%	4.1%
Don't know	16.4%	14.8%	13.1%	15.1%	10.1%
Grand Total	100%	100%	100%	100%	100%
N	804	1590	329	2 723	346

Half (52%) of past fellows (end of fellowship before 2016) who responded to the survey were offered career advice during their fellowship and about one third (35%) states that this has helped them in career-related decision-making.

Table 38. Responses by action: During your fellowship, were you offered career advice?

During your fellowship, were you offered career advice?	COFUND	IF	ITN	Total
No	52.1%	46.3%	46.7%	47.8%
Yes and it helped me in my career-related decision-making	34.0%	37.2%	32.9%	34.8%
Yes, but it did not help me in my career-related decision-making	14.0%	16.5%	20.4%	17.4%
Total	100%	100%	100%	100%
No	315	540	550	1 405

Fellows were also asked to estimate the proportion of working time spent teaching during their fellowship/time as a PhD or post-doc. The results are presented in Table 39: The proportion of working time spent teaching is very similar for IF fellows and the IF comparison group and only 1 in 10 Experienced Researchers with an MSCA fellowship is not teaching. This suggests that IF fellows perform similar tasks as

comparable researchers in addition to their research at their institutions. The reason maybe that fellows see the acquisition of teaching experience as an important element of their employability when intending to stay in academia. For example, both the coordinator and funded IF fellow of the MUIIME¹⁶¹ project emphasise that the MSCA project allowed the fellow to improve her teaching skills and that this is seen as a great benefit by both the fellow and the organisation.

The high share of ITN fellows doing no or only very little teaching (up to 5%) stands out and with 56% is substantially higher than that among the comparison group (27%). Moreover, the share of ITN fellows who spent more than 10% of their working time teaching (21%) is small in comparison to comparison group researchers (41%).

Table 39. Responses by action and comparison group (only researchers): Estimated working time spent teaching during fellowship/PhD/post-doc

During your fellowship/PhD/Post-doc, please estimate how much of your working time was spent teaching	COFUND	IF	ITN	Total	Comparison group of ER researchers	Comparison group of ESR researchers
More than 50%	1.7%	3.1%	0.3%	1.4%	3.2%	2.0%
41-50%	3.2%	5.9%	0.5%	2.6%	3.3%	2.6%
31-40%	5.2%	8.5%	1.3%	4.1%	4.7%	5.4%
21-30%	12.5%	14.1%	5.6%	9.3%	12.2%	12.0%
11-20%	18.3%	21.1%	12.8%	16.2%	20.7%	23.2%
6-10%	21.8%	20.8%	23.2%	22.2%	24.1%	28.1%
Up to 5%	18.3%	16.6%	30.0%	24.0%	16.8%	17.5%
None	19.1%	9.9%	26.2%	20.1%	15.0%	9.2%
Total	100%	100%	100%	100%	100%	100%
N	816	1 409	2 493	4 718	3 085	139

The time not spent teaching does not seem to automatically translate into more time spent conducting research. As shown in Table 40, although ITN fellows spent less time than their comparison group counterparts teaching, both groups of researchers have a very similar distribution of time spent conducting research. This implies that ITN fellows use the time not spent teaching for other activities. Unfortunately, the survey data available does not allow to assess what exactly these other activities are. Interviews with ITN supervisors suggest, however, that the training and networking activities, including secondments, take up a substantial proportion of ITN fellows' time.

¹⁶¹ Milk banking and the Uncertain Interaction between Maternal Milk and Ethanol, MSCA-IF-EF-Career Restart panel

Table 40. Responses by action and comparison group (only researchers): Estimated working time spent conducting research during fellowship/PhD/post-doc

During your fellowship/PhD/Post-doc, please estimate how much of your working time was spent conducting research	COFUND	IF	ITN	MSCA Total	Comparison group of ESR researchers
91-100%	49.7%	40.1%	32.5%	37.8%	28.2%
75-90%	36.5%	36.1%	41.7%	39.1%	38.2%
50-74%	11.5%	17.8%	19.3%	17.5%	24.4%
25-49%	1.5%	4.9%	4.8%	4.2%	6.0%
<25%	0.9%	1.2%	1.3%	1.2%	2.0%
None	0.0%	0.0%	0.4%	0.2%	1.1%
Total	100%	100%	100%	100%	100%
N	819	1 408	2 491	4 718	346

4.1.2.9 Impact on building and strengthening networks at organisational level

The building and strengthening of national and international networks at organisational level is one of the main objectives of MSCA projects. The evidence collected as part of this evaluation assignment indicates that MSCA is effective in building and sustaining such networks.

MSCA projects supported a variety of networks and partnerships throughout FP7 and Horizon 2020, many of which were new partnerships. Institutions responding to the online survey on average indicated that roughly half (53%, or on average one partner per project)¹⁶² were 'new' in the sense that they had not previously worked with those organisations. Based on these survey responses:

- An estimated 7 300 new partnerships were formed between MSCA participants so far in FP7 and Horizon 2020 (53% of all partnerships were new so a further 6.400 of the partnerships were with pre-existing collaborators (47%)) across the programme under FP7 and Horizon 2020.¹⁶³
- Estimates suggest that across the programme, participants will work with around 11 600 project partners ((85%) again in future.

Whilst the programme supported a substantial share of new partnerships, MSCA projects were also often a result of previous collaboration. MSCA in particular supported exchange between universities who had previously collaborated in FP7. 13% of all universities responding to the online survey stated that this was the case.

¹⁶² Data based on 1 396 survey responses (matched with 1 244 projects). This is a weighted average to take into account overrepresentation of ITN projects in the online survey.

¹⁶³ Based on average number of new partners reported and using the following base: (number total participations in MSCA under FP7 and H2020) – (number of projects in MSCA under FP7 and H2020) ≈ 13 700.

ITN projects most frequently built on previous exchange between universities under FP7 (in 20% of cases), and least frequently in IF projects (8% of all cases).¹⁶⁴ Organisations also tend to collaborate with partners that they know from other EU research grants. Under FP7, 43% of university collaborations taking place under MSCA also took place in other parts of FP7. Under Horizon 2020 so far, 22% of the university collaborations taking place under MSCA have also taken place in other parts of Horizon 2020.¹⁶⁵

Looking only at projects that were not a continuation of previous research, 19% of respondents indicated that MSCA helped in winning follow up funding from Horizon 2020. In these cases therefore the programme had a strong effect on establishing new collaborations at the organisations level, and ensuring that these collaborations are long-lasting. 30% of these 'new' projects indicated that follow-up research with support from national funding programmes, and 5% indicate that MSCA projects have helped in winning funding from the European Research Council.¹⁶⁶

4.1.2.10 The MSCA ITN network as a case in point

Of particular interest for the investigation of networking and collaborative effects at the organisations level is the ITN scheme. ITN projects tend to involve a significantly higher number of participants (8.5 compared to 1.9 on average for the MSCA programme overall in FP7 and Horizon 2020). The ITN scheme was therefore investigated in more detailed through a social network analysis.¹⁶⁷ The network of ITN participants exhibits a very centralised structure, reflecting the overall concentration of MSCA participation on a small number of organisations (see above). The network is most akin to a spoke wheel layout, consisting of a core group of *usual suspects* dominated by universities, a rim of further organisations which include a number of well-connected private companies and a periphery of actors which are not well connected. The key results of the network analysis of the ITN scheme are as follows:

- Overall, the ITN scheme has certainly enabled network formation and increased interconnectedness. This is shown for the network as a whole by the fact that the actors themselves more connected over time, and by the fact that the network has become more dense over time.
- Actors on the rim of the network can and do play important roles in brokering knowledge. This applies in particular for a group of private companies, which do not take a prominent place in the network core but do connect peripheral actors from EU13 and widening countries to the core of well-established university participants.
- The ITN scheme has further helped in strengthening cooperation between a large set of universities which form the core of the network, and private companies which form part of the rim around the network core.
- The most frequent collaborations were between southern and western European organisations from France, Germany, Italy, Spain, the UK, the Netherlands and Belgium.

¹⁶⁴ Source: ICF survey of MSCA funded organisations – Survey Question 'Was/is the MSCA funded research a continuation of research that was funded by the following (choose all that apply)?'

¹⁶⁵ Source: Social network analysis, CORDA data.

¹⁶⁶ Source: ICF survey of MSCA funded organisations in IF, ITN, COFUND and RISE(IAPP/IRSES). Survey question: 'Has participation in MSCA helped you to acquire additional research funds (choose all that apply)?' Projects which were a continuation of previous research and 'too early to tell' responses are excluded from the analysis.

¹⁶⁷ The Social Network Analysis investigated betweenness centrality, power centrality and degree at the organisational and country level, and reviewed the characteristics of the network of ITN participants overall.

- The core of the network is made up of universities and research centres, most of them from the EU15 countries. Figure 38 below represents the top-5% performing actors in the network.

Organisations' satisfaction with the partnerships they build as a result of their MSCA project is similar to the satisfaction reported by fellows: 8 out of 10 organisations are (strongly) satisfied.

118

Table 41. Responses (only organisations): Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?

Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?	Total
Strongly satisfied	46.7%
Satisfied	36.2%
Neither dissatisfied	4.9%
Dissatisfied	0.9%
Strongly dissatisfied	1.4%
Don't know	1.8%
Not (yet) applicable	8.2%
Total	100%
N	2 902

Note: Please see Annex 4 for a breakdown by action.

MSCA projects more often involve partners from academia than non-academia (Table 42) but almost half of the projects involve non-academic partners from abroad and non-academic partners from the same country. Table 42 shows that MSCA projects have a strong cross-border dimension whereas among all four actions, ITN stands out: almost all projects involve collaboration with (other) academic organisations from abroad and more than two thirds of projects involve collaboration with non-academic organisations from abroad.

Table 42. Type of organisations organisations have carried out research with during the MSCA project

During your MSCA project, did/does your organisation carry out research with...	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
...(other) academic organisations in the country where your organisation is based?	70.8%	79.6%	77.0%	65.7%	75.0%
...(other) academic organisations abroad?	72.3%	87.0%	94.5%	63.8%	83.5%
...(other) non-academic organisations in the country where your organisation is based?	55.3%	45.8%	59.8%	33.0%	47.5%
...(other) non-academic organisations abroad?	44.7%	36.4%	67.6%	31.4%	46.3%

The share of organisations which create new collaborations with organisations abroad as result of the MSCA project is higher than the share of organisations which create

new collaborations with organisations in the same country (Table 43). This indicates that the MSCA programme is effective in fostering cross-border cooperation and contributing to the ERA. About 9 out of 10 organisations participating in COFUND, IF and ITN create collaborations with (other) academic organisations abroad. COFUND and ITN stand out with regard to the creation of collaborations with non-academic organisations abroad (7 out of 10 organisations participating in COFUND and 8 out of 10 organisations participating in ITN).

Table 43. Type of organisations organisations have created new collaborations with during MSCA project

[If organisation indicated that new collaborations were created: Were these new collaborations with... (share of organisations stating yes in%)]	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
...(other) academic organisations in the country where your organisation is based?	52.9%	47.4%	25.3%	69.7%	45.4%
...(other) academic organisations abroad?	89.5%	90.3%	95.4%	61.7%	84.3%
...(other) non-academic organisations in the country where your organisation is based?	57.1%	24.8%	28.7%	35.4%	30.2%
...(other) non-academic organisations abroad?	68.8%	26.7%	80.9%	29.6%	52.5%

The sustainability of the networks between organisations created under MSCA is very high for both collaborations with academic and non-academic organisations: 9 out of 10 organisations state to have fully developed plans or to be currently developing plans for future collaboration with (other) academic organisations from their MSCA network. Similarly, 8 out of 10 organisations report to have fully developed plans or to be currently developing plans for future collaboration with non-academic organisations from their MSCA network. Survey results also indicate that cross-border collaborations are equally sustainable as collaborations within the same country.¹⁶⁹

4.1.2.11 Impact on organisations' research capacity

Table 44 presents the extent to which participation in MSCA affects various aspects of organisations' research capacity. The items are sorted by the share of organisations which state that MSCA has contributed to a (very) large extent to the particular aspect of research capacity. The results show that MSCA most importantly affects aspects of research capacity related to international collaboration and mobility of researchers, as well as collaboration across scientific disciplines. According to more than half of organisations, participating in MSCA also improves organisations' capacity to bid for (other) research funds.

¹⁶⁹ For further details, please see Annex 4.

Table 44. Perceived impact of MSCA on various aspects of organisations' research capacity, by action (Share of organisations stating to a (very) large extent in%)

To what extent has/will the participation in MSCA contributed/contribute to strengthening the following aspects of research capacity of your organisation? (Share of organisations stating to a (very) large extent)	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Strengthening existing international collaborations with academic or non-academic organisations	57.1%	63.6%	81.7%	79.5%	73.9%
Contributing to the internationalisation of my organisation and/ or the capacity of its researchers to conduct research abroad	66.7%	67.1%	66.8%	71.8%	68.2%
Increasing the global reputation of my organisation	71.4%	66.5%	66.0%	70.1%	67.3%
Working with individual researchers and/or other research teams from different scientific disciplines	49.0%	46.3%	61.1%	62.7%	55.8%
Improving capacity to bid for other research funds	44.9%	56.2%	51.7%	53.0%	53.6%
Strengthening existing national collaborations with academic or non-academic organisations	51.0%	39.3%	45.1%	45.0%	43.0%
Providing access to new tools, research facilities or equipment	20.4%	33.4%	39.8%	50.9%	39.9%
Strengthening control over research agenda through bottom up approach of MSCA research proposals	20.8%	37.2%	37.2%	33.9%	36.1%
Enabling access to business know-how	20.8%	9.6%	20.8%	23.8%	17.4%
N (base to which share is referring to)	49	1081	1 006	742	2 878

The below box summarises evidence on MSCA's impact on organisations' research capacity from the case studies.

Box 2: MSCA's impact on organisations' research capacity

More generally, the case studies illustrate why in particular IF fellows are often seen as a very valuable enhancement of the existing research group. In the view of

coordinators, they bring new ideas to the team, but also contribute to building a critical mass of researchers working on the same topic. The coordinator of the MUIIME project, for example, stated that while the university had done earlier research in this area, participation in MSCA has helped her team to build a strong research focus on breast feeding.

The case studies also provide evidence of MSCA's effective of providing private sector organisations with access to valuable knowledge and resources. As part of the MICACT project (ITN), the private sector company involved has been given access to a scientific database and resources for analysis through its collaborators at the university. This enables the company to evaluate the feasibility of producing particular products. The company also views the in-house knowledge gained by having an Early Stage Researcher as important.

In the GLYCANC project (RISE), consortium partners have benefited from state of the art techniques for analysing cancer cells of a private company involved in the project, and a novel analytical technique developed by one of the university research teams involved. Both processes have been applied by project partner research groups, not least to test its potential for patenting in the future.

4.1.2.12 Direct and indirect outputs and results achieved by MSCA projects at organisational level

Almost all organisations report to have had planned to produce peer-reviewed publications as output of their MSCA projects (92%), and in 90% of projects this has been achieved. Other types of outputs are considerably less often planned in the framework of MSCA projects and they also seem to be harder to achieve than peer-reviewed publications: While prototype developments and demonstrations and new improved technical codes and standards are still achieved by around 8 in 10 organisations that planned such output, the share of organisations which achieved planned (close to) market ready output – such as patent/trademark applications or new or improved products, processes, and services – is much lower (45% and 47% respectively).¹⁷⁰ With the data collected, it is not possible to determine whether this is due to proposals being overly optimistic, an insufficient time-frame of MSCA projects, or simply the uncertainty implied in research and the risk that outcomes are not as expected.

4.1.2.13 Commercial results generated by MSCA projects at organisational level

Table 45 shows that only few organisations benefit commercially from the outputs of MSCA projects. Of those organisations which do, most benefit from the direct use of the project results internally.

Table 45. Responses by action (only organisations): Has your participation in MSCA produced commercial benefits for your organisation? Select all that apply.

Has your participation in MSCA produced commercial benefits for your organisation? Select all that apply.	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Yes, from the direct use of project results in my organisation	2.6%	3.3%	4.6%	3.7%	3.9%

¹⁷⁰ Please see Annex 4 for further details.

Has your participation in MSCA produced commercial benefits for your organisation? Select all that apply.	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Yes, from sale/licensing of product	0.0%	0.5%	0.8%	1.4%	0.7%
Yes, from sale / licensing of the intellectual property produced (IP)	0.0%	0.2%	0.3%	0.0%	0.2%

4.1.2.14 Employment results generated by MSCA projects at organisational level

The evidence presented in Table 46 shows MSCA have had a leverage effect on job creation. More than one in three organisations indicated in the survey that participation in MSCA had helped create new jobs in addition to staff directly funded by the project. In total, 23% of organisations had created (or will create) one additional full time equivalent job while 12% of organisations had created two or more FTE posts as a result of participation in MSCA.

Table 46. Responses by action (only organisations): Number of jobs created as a result of MSCA project (excluding staff directly funded by MSCA), share of organisations in%

How many jobs have been/will be newly-created in your organisation as a result of your MSCA participation in this project? (in Full Time Equivalent (FTE) – please exclude staff directly funded by the MSCA project)	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
0 FTE	44.4%	63.2%	59.3%	70.8%	63.5%
less than 1 FTE	8.3%	0.7%	1.7%	0.6%	1.1%
1 FTE	8.3%	28.6%	23.3%	15.9%	23.2%
2 FTE	2.8%	4.4%	9.6%	7.1%	6.9%
3 FTE	2.8%	1.4%	3.4%	2.4%	2.4%
4 FTE	0.0%	0.5%	0.8%	1.2%	0.8%
5 FTE	5.6%	0.5%	0.5%	1.0%	0.7%
more than 5 FTE	27.8%	0.6%	1.4%	1.0%	1.4%
Total	100%	100%	100%	100%	100%
N	36	981	935	679	2 631

4.1.2.15 Negative and positive factors influencing the achievements observed at the organisational level

The findings of the case study on the MICACT project suggest that the impact of MSCA participation at the organisational level depends on an organisation's situation and research capacity prior to the project:

Box 3: MICAT case study - findings

For universities situated in countries with less resources on a national scale, such as the Polytechnic University of Cartagena (ES) involved in the MICACT project, MSCA funds ESR positions that could otherwise not be afforded. The project has consequently considerably improved the research capacity of the research group involved in the project.

For Tartu University, the availability of research funding was less relevant than getting access to a vast network of partners in order to increase the visibility of the quality of existing research. Tartu University is eager to sustain the collaborations established as they provide credibility and facilitate applications for new projects and the establishment of other collaborations.

For Linköping University, which already had a large network and a good funding situation relative to the Spanish partner, the most important impact perceived was the ability to attract excellent researchers and the visibility the MSCA funding brings about.

The project coordinators' ability to effectively manage the consortium and to ensure that the MSCA project is implemented on the basis of a work plan that sufficiently takes into account all partners' needs emerges as another factor influencing the achievements observed. The case studies and comments provided by organisations through the survey show that project partners have different needs and that satisfaction with the project depends on the extent to which the consortium finds a fair compromise to accommodate these. This includes various elements of the project, from the length of secondments to the formula used for sharing the institutional unit costs.

4.1.2.16 Unexpected and unintended effects of MSCA at the organisational level

Similar to fellows, organisations have very clear expectations when applying for MSCA funding and therefore only very few report unexpected or unintended effects. These mostly concern unexpectedly well-functioning collaborations and a certain degree of astonishment about the wealth of ideas that is generated within the network.

4.1.3 The impact of MSCA at the system level

The impact of MSCA on individual researchers and organisations can be expected to aggregate to a system level effect. It is difficult to precisely quantify this system level impact as direct, quantitative evidence on the link between system level developments and the existence of the MSCA programme and its funding opportunities is difficult to establish. An exception is COFUND, which is the action designed to have a more structural impact on national doctoral and fellowship programmes.

4.1.3.1 The structural impact of COFUND

The survey results presented in Table 47 and Table 48 suggest that COFUND has a substantial effect on opportunities for researchers for cross-border mobility in a country, both through the creation of new programmes and the opening of existing programmes for transnational mobility. One third of COFUND organisations which responded to the survey report that participation in COFUND has increased the

number of transnational fellowships to a (very) large extent. Table 47 also shows that the impact of COFUND on increasing the number of fellowships with an intersectoral or interdisciplinary dimension is smaller than its impact on the number of transnational fellowships.

Table 47. Impact of COFUND on increasing number of fellowships, by type of fellowship

Has your participation in MSCA COFUND helped in increase the number of fellowships?	Share of COFUND organisations reporting to a (very) great extent	Share of COFUND organisations reporting to a moderate extent	Share of COFUND organisations reporting to a small extent
transnational	32.7%	16.3%	6.1%
intersectoral	6.1%	12.2%	2.0%
interdisciplinary	6.1%	12.2%	8.2%
N	49	49	49

Table 48 presents in more detail the areas COFUND has an impact. Almost half of organisations which responded to the survey report that participation in the COFUND action to a (very) great extent helped in creating a new transnational fellowship programme (ER level) and one third indicate that it helped to a (very) great extent in opening an existing programme for transnational mobility. Fewer organisations indicate that COFUND helped to a (very) great extent in opening an existing programme for intersectoral or interdisciplinary mobility (18% and 17% respectively).

Table 48 shows that apart from its impact on mobility, COFUND helps a substantial share of organisations to improve the provision of training and career development, as well as employment conditions under existing schemes for both ESR and ER. The table also shows that opening up existing programmes for interdisciplinary and intersectoral mobility occurs more often at the ESR level than at the ER level.

Table 48. Impact of COFUND on creating new or improving existing programmes, per type of COFUND (ESR, ER)

Has your participation in MSCA COFUND helped in...	ESR (PhD candidate level)					N
	To a (very) large extent	To a moderate extent	To a small extent	Not at all	Don't know	
...creating a new transnational doctoral training programme	60.0%	0.0%	0.0%	40.0%	0.0%	10
...improving training and career development of fellows under an existing programme	55.6%	33.3%	11.1%	0.0%	0.0%	9
...improving employment	22.2%	11.1%	11.1%	44.4%	11.1%	9

	ESR (PhD candidate level)					
Has your participation in MSCA COFUND helped in...	To a (very) large extent	To a moderate extent	To a small extent	Not at all	Don't know	N
conditions of fellows under an existing programme						
... opening an existing programme for transnational mobility?	33.3%	33.3%	11.1%	22.2%	0.0%	9
... opening an existing programme for intersectoral mobility	44.4%	11.1%	22.2%	22.2%	0.0%	9
...opening an existing programme for interdisciplinary mobility	33.3%	33.3%	11.1%	22.2%	0.0%	9
	ER (PhD level or higher)					
Has your participation in MSCA COFUND helped in...	To a (very) large extent	To a moderate extent	To a small extent	Not at all	Don't know	N
...creating a new transnational fellowship programme	47.5%	5.0%	5.0%	37.5%	5.0%	40
...improving training and career development of fellows under an existing programme	47.2%	11.1%	5.6%	27.8%	8.3%	36
...improving employment conditions of fellows under an existing programme	40.5%	8.1%	8.1%	35.1%	8.1%	38
... opening an existing programme for transnational mobility?	36.8%	13.2%	5.3%	36.8%	7.9%	38
... opening an existing programme for intersectoral mobility	14.7%	5.9%	5.9%	58.8%	14.7%	34
...opening an existing programme for interdisciplinary mobility	16.7%	11.1%	19.4%	41.7%	11.1%	36

A tangible structural impact of COFUND can be expected in countries with several parallel-running COFUND projects and relatively high total EU co-funding, such as Ireland, Switzerland, The Netherlands, but also Spain and France.

A structural impact of COFUND also occurs if national schemes are adjusted to fit the COFUND requirements in view of applying for COFUND. This has been reported by one of the key informants interviewed as part of this assignment. In Estonia policy makers based the design of a new national scheme on the COFUND requirements in order to get access to this important funding opportunity.

Adapting national funding strategies to enable access to COFUND funding has also been reported by an interviewee from Austria.

In Poland, COFUND is used by the National Science Centre as an instrument to provide excellent Polish researchers who had left Poland with an opportunity to return: the MSCA fellowships offer these returnees attractive salaries and working conditions in combination with a two-year job guarantee in their home country. According to the project coordinator, 52% of fellows of the first call and 42% of fellows of the second call were returning Polish nationals. Interviewees of the POLONEZ case study report that in the absence of such conditions, it would be very difficult to attract returning, but also other international researchers, to Poland. Interviewees saw this as a positive impact of COFUND on the internationalisation of the Polish research landscape.

4.1.3.2 The impact of the European Researchers' Night on changing public perceptions of science

The European Researchers' Night aims at raising awareness of the general public, in particular young people, of researchers' work, and at enhancing the attractiveness of research careers. It can therefore be considered to be aiming for a (local) system level impact on the catchment area of the organisation hosting the event.

According to the evaluations' NIGHT survey, the predominant types of dissemination activities carried out by the researchers' organisations within the scope of their projects were: hands-on experiments including science demonstrations, shows, and simulations (92%); presentations (89%); through the media including TV, radio, and written press (84%), and through games, competitions, and quizzes (82%).

Organisations participating in the European Researchers' Night projects are very positive about the events' contribution to the various dimensions of interaction between research and the public listed in Table 49. On the one hand, there is a broad consensus (two thirds of organisations strongly agree) that the European Researchers' Night projects contribute to establishing direct contacts between researchers and the public at large and that it increased the visibility and understanding of researchers' work. On the other hand, the responses show that European Researchers' Night events – in line with their core objectives – have a rather national, or even local dimension, with a relatively low share of organisations strongly agreeing that the project has increased the international reputation of the organisation or that it has established new partnerships with organisations from other countries.

Table 49. Impact of MSCA European Researchers' Night

Would you agree or disagree that your European Researchers' Night project has contributed to the following?	Share stating "Strongly agree"	Share stating "Rather agree"	Share stating "Rather disagree"	Share stating "Strongly disagree"	Share stating "Do not know/ Not applicable"

Would you agree or disagree that your European Researchers' Night project has contributed to the following?	Share stating "Strongly agree"	Share stating "Rather agree"	Share stating "Rather disagree"	Share stating "Strongly disagree"	Share stating "Do not know / Not applicable"
Our project has established direct contacts between researchers and the public at large	71.6%	22.0%	1.4%	2.1%	2.8%
Our project has contributed to increasing visibility and understanding of researchers' work	69.5%	26.2%	2.1%	0.0%	2.1%
Our project has increased the national reputation of our organisation	52.5%	34.8%	6.4%	0.7%	5.7%
Our project has contributed to combating the prevailing stereotypes about researchers	48.2%	44.7%	3.5%	0.7%	2.8%
Our project has contributed to increasing the attractiveness of research careers	46.8%	46.1%	0.7%	0.7%	5.7%
Our project has contributed to raising awareness of researchers' personality	45.0%*	42.9%	7.1%	0.0%	5.0%
Our project has encouraged the research community to rethink its professional identity and role	32.6%	44.0%	13.5%	2.1%	7.8%
Our project has contributed to attracting more students to our organisation	31.4%*	40.7%	7.9%	2.1%	17.9%
Our project has encouraged people to choose a research career	31.2%	49.6%	7.1%	0.7%	11.3%
Our project has established new partnerships with bodies from outside academia	27.9%**	46.3%	12.5%	0.7%	12.5%
Our project has increased the international reputation of our organisation	23.4%	35.5%	22.0%	3.5%	15.6%
Our project has established new partnerships with organisations	16.3%	22.7%	31.2%	9.2%	20.5%

Would you agree or disagree that your European Researchers' Night project has contributed to the following?	Share stating "Strongly agree"	Share stating "Rather agree"	Share stating "Rather disagree"	Share stating "Strongly disagree"	Share stating "Do not know/ Not applicable"
from other countries					

*N=141; *N=140; **N=136.*

European Researchers' Night projects seem to have enabled the participating organisations to better involve various groups of stakeholders compared to previous or other events, in particular the young. More than half of the responding organisations report to have to a large extent involved a larger number of young adults (18+) and young people at primary and secondary school age, compared to previous MSCA events or other events. Moreover, almost half of organisations state that they were able to involve the Media to a larger extent than in previous events. This finding is corroborated by the interviews conducted with project coordinators as part of the case study, who confirm that the European dimension of the events (events taking place in many European locations on the same day) generates media's, but also other stakeholders' interest.

Table 50. Participation of various stakeholders in the European Researchers' Night event compared to previous /other events

To what extent did participation in the European Researchers' Night project enable your organisation to involve a larger number of people from the following groups in the implementation of the project compared to previous/other events? (choose all that apply)	Share stating "to a large extent"	Share stating "to a moderate extent"	Share stating "to a small extent"	Share stating "not at all"	Share stating "New group not yet involved in previous/other events"	Share stating "Don't know"	N
Young people at secondary school age (<18 years of age)	55.4%	26.6%	6.5%	2.2%	5.8%	3.6%	139
Young people at primary education age (<12 years of age)	53.3%	16.1%	12.4%	6.6%	7.3%	4.4%	137
Young adults (18+)	51.5%	27.9%	10.3%	2.2%	2.9%	5.1%	136
Media	46.1%	29.7%	8.6%	2.3%	2.3%	10.9%	128
Adults (30+)	42.6%	35.7%	11.6%	3.1%	1.6%	5.4%	129
Representatives of parents/teachers	36.9%	34.4%	11.5%	3.3%	1.6%	12.3%	122
Public bodies	18.3%	29.2%	24.2%	7.5%	1.7%	19.2%	120
Older people (60+)	16.8%	41.6%	23.2%	4.8%	3.2%	10.4%	125
NGOs	9.3%	19.6%	28.0%	18.7%	0.9%	23.4%	107
Private companies	8.7%	22.6%	34.8%	11.3%	0.9%	21.7%	115
Foundations	7.4%	18.5%	25.0%	17.6%	1.9%	29.6%	108

Insights from NIGHT case studies support the evidence collected through the online surveys regarding the attractiveness of the events and their ability to bring researchers and the general public together. While it is difficult to quantify the effect of a one night event on people's perception of science, all visitors generally appreciated the event and feel that it provides the opportunity to learn about research and researchers' work. The box below summarises some of the case study findings.

4.1.4 NIGHT case studies – results and impacts

Box 4: NIGHT case studies – results and impacts

Early evidence indicates that about 27 800 people attended the 2016 'Night' events across France¹⁷¹. Attendance levels are however not available for each participating city.

In Paris, most attendees interviewed were praiseworthy of the event. Key reasons for attending the 'Night' event included: (1) curiosity; (2) a general interest in the subject matter; and (3) a general interest to learn about what researchers do.

When asked about whether the event had changed their views on the benefits of research and science to society, only a few participants responded in the affirmative. For the rest, they explained that they already hold positive views as regards science and its impacts. Consequently, the event did not specifically influence their perceptions of or attitudes towards research and science. The same observations were made at the 'Night' event in Trier.

Most of the participants interviewed recognised that the event had successfully promoted careers in science.

NIGHT case studies, *Creativity 2016, France; and Illuminale, Trier, Germany*

A self-assessment of the 2015 edition of the event collected information on the **satisfaction with the event among researchers**, through a questionnaire.¹⁷²

Interestingly, they highlighted as particularly rewarding their interaction with children (see how they enjoy the activities, how they react to the experiments, etc.). They also enjoyed communicating with the general public.

Some of the interviewed young participants (at secondary school age) had a previous interest in studying a science career. In this case, they often attend the activities to look for further information on the available options. The 2015 participant survey conducted by the event organisers reaches similar conclusions: 18% of those responding to the survey question – mostly young people between 16 and 21 years-old who have not yet enrolled in tertiary education – mentioned that they had a "high" interest in following a scientific career.

NIGHT case study, *Researchers, moving Europe forward. Meet them, join them! Spain*

4.1.4.1 Impact on attracting, retaining and further developing excellent researchers

As an excellence programme, MSCA attempts to achieve a system level impact on the scientific and technological research landscape in Europe by making the research profession attractive to the most able individuals, by supporting their skills development, and by offering them very good working conditions so they remain in Europe. Against this background, survey evidence¹⁷³ shows that the vast majority of

¹⁷¹ This compares for example with reported figures of 160 000 in Italy and 180 000 in Slovakia.

¹⁷² Comillas Pontifical University (2015). Informe de evaluación de la Noche Europea de los Investigadores. Evaluación de asistentes e investigadores [Evaluation report of the European Researchers' Night. Evaluation by participants and researchers]. Available in Spanish at: http://www.madrimasd.org/lanochedelosinvestigadores2015/sites/default/assets/Estudio_impac_to_Noche_Europea_de_los_Investigadores_Madrid_2015.pdf. The 2016 report has not yet been published.

¹⁷³ For details please see the Annex 4

MSCA fellows are individuals with a clear aim of pursuing a research career: 60% of respondents estimate the likelihood to be (very) high that they would have pursued a research career in the absence of MSCA funding. The recently carried out Mid-term review of MSCA unit costs found that among the funding choices these motivated and often excellent researchers have, the conditions offered by MSCA are often better than those of comparable researchers, both in terms of available income and budget for research, training, networking

More than one quarter of organisations report that the MSCA programme has helped them to retain excellent researchers who would have left Europe otherwise. Table 51 indicates that MSCA is particularly relevant and effective as an instrument for retaining excellent researchers in Europe for Experienced Researchers (IF), as well as in the framework of COFUND programmes.

Table 51. MSCA's impact on retaining excellent researchers in Europe

Has the MSCA programme helped your organisation to retain excellent researchers who would have left Europe otherwise?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Yes, European researchers	34.6	34.0	14.3	11.6	21.4
Yes, non-European researchers	3.8	6.9	7.6	6.0	6.9
It may have helped, but it is difficult to say	42.3	34.7	41.1	36.1	37.4
No	1.9	10.7	22.8	30.9	19.9
Don't know	17.3	13.8	14.2	15.4	14.4
Grand Total	100	100	100	100	100
N	52	1 098	1 022	748	2 920

4.1.4.2 Improving organisational structures and sharing best practice beyond participating organisations

MSCA has some system level impact on Europe's research capacity by developing the skills of excellent researchers and providing them with the working conditions they need to produce excellent output. Each year, the pool of researchers who have benefitted from these very good working conditions is growing.

As only a small minority of total researchers are and can be funded by MSCA, the system level impact of MSCA depends to a significant extent on MSCA's effectiveness in inducing improvement of organisational structures that benefit all researchers, not only MSCA fellows. Moreover, the system level impact of MSCA depends on the extent to which innovation and best practices induced by participating in MSCA spill over to non-participating organisations.

Based on the survey results presented in section 4.1.2 (Impact at organisational level), but also interviews with key informants, the creation of new and strengthening of existing networks at the organisational level is one of MSCA's strengths. The largest system level impact of MSCA can therefore be expected on increasing the international, interdisciplinary, and cross-sectoral mobility of researchers and knowledge, thereby contributing to the European Research Area. Overall, MSCA networks involve a large number of organisations and in many countries there is a lack

of funding opportunities with a similar mobility focus at the national level, according to the interviews with key informants.

The analysis of MSCA's impact at the organisational level also shows that MSCA organisations more often comply with the Charter and Code in relation to the openness and transparency of recruitment processes, and that participants of the Innovative Training Networks tend to implement the Principles of Innovative Doctoral Training in relation to, for example, the quality of supervision, the quality of training, the proportion of working time available for conducting research and exposure to non-academic work places. While between 10% and 20% of organisations report that they already had good conditions in place before participating in MSCA, between one quarter and half of organisations surveyed, indicated that MSCA participation has to a (very) large extent led to improvements in areas related to the training and career development of researchers.

While it is likely that the partnerships built, experiences made and trainings developed as part of MSCA projects will in some way also benefit non-MSCA researchers at the same organisation, it is more difficult to assess whether the best practices developed at one organisation will spill over to others.

One mechanism through which spill over may occur is competition between organisations for the best researchers, who will choose the organisation offering the best conditions. This may incentivise organisations to adhere to the Charter and Code and the PIDT in order to remain competitive. Another mechanism through which spill over may occur is the (voluntary) sharing of best practice. These mechanisms may be hampered by the strong competition between organisations, for example for ITN grants.

Interviews with key informants did not generate consistent evidence in support of the existence of significant spillover effects, indicating that such effects may be context specific. Few interviewees state that in their view there are no spillover effects, most interviewees find this question difficult to assess. Some interviewees, however, pointed to concrete examples of system level impacts of MSCA: According to one interviewee, ITNs have had an impact on national doctoral programmes in Austria as they set best practice examples which are followed by other organisations, also those not receiving EU funding.

In Poland, MSCA and the related obligation to commit to the Charter and Code is perceived to have contributed to the better advertisement of job offers and subsequently to stronger competition for positions and higher quality of researchers. Moreover, the interviewee states that because job offers are now published in European job databases, it has become easier for Polish organisations to attract researchers from abroad.

In Austria and Estonia, interviewees report that national funding schemes have been adapted to fulfil the COFUND requirements.

4.1.4.3 Unintended effects at the system level

No unintended effects of MSCA at the system level have been identified. The programme has a strong focus on excellence, which is visible in the fact that the vast majority (83%) of fellows hosted under MSCA so far are hosted in EU12 Member States. At the same time, some countries also exhibit a large proportion of returnees, allowing nationals to return to their country of origin (see section 1.5.3 for more details). Both of these effects are not explicitly covered by any of the programmes specific objectives, and can therefore be regarded as unintended effects at system level.

4.2 Contributions to cross-cutting objectives of Horizon 2020

As outlined above in section 1.3, the five specific objectives of MSCA overlap with a number of cross-cutting issues in Horizon 2020. Section 4.2 discussed how effective MSCA was in achieving its specific objectives. This section investigates how effective MSCA was in contributing to the Horizon 2020 cross-cutting issues.

4.2.1 Widening participation

A total of 2 061 entities from widening countries applied to the programme so far under Horizon 2020, within 5 406 project proposals, including those applying as partner organisations. 7% of these proposals were retained for funding, involving 379 widening countries participants. Whilst the relative share of distinct projects that actors from widening countries are involved in decreased slightly between FP7 and Horizon 2020 so far, the relative share of distinct organisations from Widening Countries increased from FP7 to Horizon 2020, from 12% to 16% so far.

EU-13 countries (the 13 countries which have joined since 2004) receive 4.6% of total MSCA funding although they represent 12% of the EU researcher population and indeed 20% of the total EU population. There are wide discrepancies between Member States in their ability to attract funding, with EU-15 countries out-performing EU-13 countries. Other data show that in general EU-13 countries tend to submit fewer proposals than EU-15 countries and that the quality of submitted proposals is also lower.

4.2.2 Addressing societal challenges

In principle, MSCA is a fully bottom-up programme, with no pre-defined research topics. In practice, MSCA projects cover all societal challenges, represented by individual scientific panels to which proposals were submitted. Life Sciences was the most prominent thematic panel in MSCA FP7 (17% of all projects) and in Horizon 2020 (26% of all projects) – Economics and Mathematics were the two panels least represented in Horizon 2020 MSCA projects, a similar picture can be seen in FP7.¹⁷⁴

A text mining exercise of MSCA project summaries suggests that the societal challenges were covered more strongly in Horizon 2020 than in FP7, a result that would be expected given this specific focus on societal impact was only introduced in Horizon 2020. In both framework programmes the societal challenge on smart, green and integrated transport appeared to be covered least often by project summaries, whilst the social challenges on food security/bioeconomy and Europe in a changing world were addressed most often by project summaries.

19% of the EU budget spent so far on MSCA in Horizon 2020 has been allocated to projects under the social and economic sciences and humanities panels. In FP7 projects under comparable panels received 12% of the overall EU funding – however some action specific panels which might have included projects related to social and economic sciences as well as humanities are not included in this figure.

To investigate the extent to which MSCA projects under Horizon 2020 covered topics related to Climate, Biodiversity, sustainable development and ICT Research and Innovation, DG RTD statistics were reviewed. The data suggests that 12%, 6%, and 40% of MSCA budget under Horizon 2020 so far address issues related to climate, biodiversity, sustainable development and ICT respectively. Whilst the share of MSCA budget spent on climate and sustainable development related issues so far is lower

¹⁷⁴ It has to be noted here that the proportions of projects by panels are not comparable between FP7 and Horizon 2020, as FP7 included a number of separate panels for some specific actions, such as the European Industrial Doctorates, COFUND, Career Reintegration Grants and IRSES. These action specific panels were abolished in Horizon 2020.

than across Horizon 2020, the share of budget allocated to biodiversity related projects is above the overall share across Horizon 2020.

In addition, a particular focus on addressing societal challenges through applied research can be noted in the European Industrial Doctorates scheme, which was launched in 2013 under FP7 and has been allocated EUR55 million in FP7 (1% of all MSCA EU funding under FP7) and EUR84 million in Horizon 2020 so far (4% respectively).

4.2.3 Gender dimension and gender equity

Proposals submitted under the MSCA programme are encouraged to take appropriate measures to facilitate mobility and counter-act gender-related barriers to it. MSCA work programmes encourage the implementation of training on gender issues and actions to reduce or remove gender-related barriers. Equal opportunities are to be ensured in the implementation of the actions by a balanced participation of women and men, both at the level of supported researchers and that of decision-making/supervision/management structure. In research activities where human beings are involved as subjects or end-users, gender differences may exist. In these cases the gender dimension in the research content has to be addressed as an integral part of the proposal to ensure the highest level of scientific quality.

Around 41% of MSCA grants funded in Horizon 2020 until January 2017 take into account the gender dimension in research and innovation, compared to 25% of all grants funded during the same period across Horizon 2020. This suggests that the specific focus of MSCA on gender aspects results in a particularly strong contribution towards this cross-cutting issue.

The MSCA also have a strong track record in increasing gender equity, which is continuing under H2020. To date, 40% of MSCA-supported researchers are women¹⁷⁵. This has increased in relation to FP7 where it was 37% and is higher than the average percentage of female researchers in Europe¹⁷⁶ and other areas of Horizon 2020.

Notably, the proportion of women participating in each individual MSCA scheme has increased between FP7 and Horizon 2020, with the exception of the RISE programme. The data available for the Horizon 2020 MC-ITN and Horizon 2020 COFUND schemes displays the most gender parity.¹⁷⁷

Furthermore, MSCA grants under Horizon 2020 so far saw a large share of female coordinators (47%), when compared to the number of female coordinator across the framework programme (33%). The figure is balanced by the smaller representation of female as supervisors in Individual Fellowships (21%), which reflects the glass ceiling apparent among academic staff and research boards.

4.2.4 Responsible research and innovation

MSCA endorse the Horizon 2020 Responsible Research and Innovation (RRI) cross-cutting issue, engaging society, integrating the gender and ethical dimensions,

¹⁷⁵ If all staff are counted, women in MSCA account for 50% of the total compared with 40% in Horizon 2020 overall.

¹⁷⁶ SHE Figures 2015:

https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-leaflet-web.pdf

¹⁷⁷ ITN projects are required to present their recruitment strategy in the project proposal, whilst fellows apply for IF funding apply directly with the European Commission. Therefore higher parity in the ITN scheme shows that organisations pay specific (and increasing intention) to parity in recruiting, whilst gender balance is not part of the evaluation and selection criteria applied by the European Commission to select beneficiaries of individual fellowships.

ensuring the access to research outcomes and encouraging formal and informal science education.

The MSCA programme makes a number of relevant contributions to RRI issues. First, around 8% of MSCA grants funded under Horizon 2020 so far address RRI issues directly through their research programme, a slightly larger proportion than across Horizon 2020 overall (7%). Overall, there is however little involvement of third sector organisations in MSCA projects directly. Only around 9% of those MSCA projects which are RRI relevant in the view of REA project officers involve third sector organisations directly, compared to 11% across Horizon 2020.

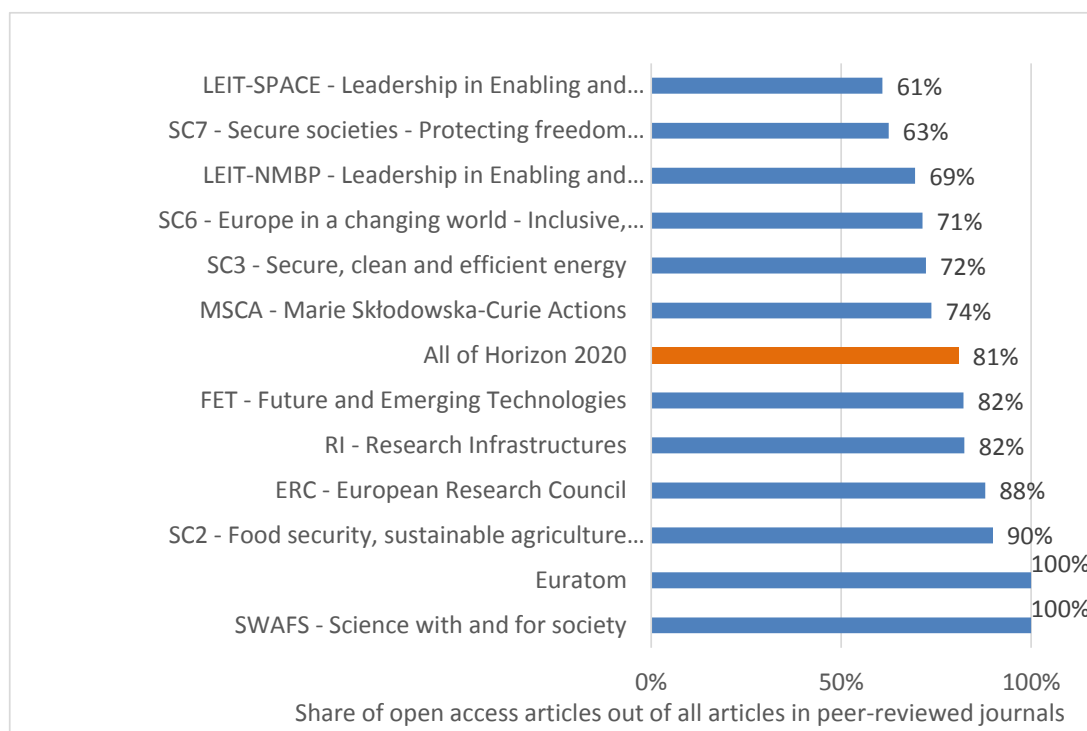
4.2.5 Open Science, Open Innovation, Open to the World

In 2016, Commissioner Moedas set out a vision for the EU's research and innovation policy which takes into account the changing nature of how knowledge is created, shared and appropriated. The vision is summarised in three principles: Open Innovation, Open Science and Open to the World.¹⁷⁸

4.2.5.1 Open Science

So far, Horizon 2020 MSCA projects have produced a slightly below average share of open access articles in peer-reviewed journals (Figure 39). However, ITN fellows had a significantly higher share of their articles published in gold open access when compared to their comparison group (42% compared to 33% between 2006 and 2016). This suggests that the programme is indeed nurturing new cultures of publishing in the next generation of Europe's leading scientists, supporting through the innovative doctoral training MSCA offers.

Figure 39. Share of open access articles out of all peer-reviewed articles published, by Horizon 2020 programme



Source: DG EAC, December 2016

¹⁷⁸ Cf. <https://ec.europa.eu/research/openvision/index.cfm>

4.2.5.2 Open Innovation

The MSCA are open to all domains of research and innovation, from basic research up to market take-up and innovation services. Research and innovation fields as well as sectors of activity are chosen freely by applicants in a fully bottom-up manner. Through the NIGHT actions, the programme makes specific contributions to Open Innovation, through involvement of the wider public and civil society actors in the research and innovation process.

4.2.5.3 Open to the World

MSCA in Horizon 2020 included a significant share of participations from Third Countries.¹⁷⁹ The programme accounts for more than half of all third country participations in Horizon 2020 so far. The MSCA-RISE is the most international scheme across Horizon 2020 so far, with around 32% of its total participations coming from Third Countries. Over the first three years of RISE 2014-16, there were almost 23 000 planned secondments with staff exchanges to or from third countries. IF(11%) and COFUND (7%) also have a degree of international participation above the Horizon 2020 average (4%).¹⁸⁰

When including partner organisations, the top five third countries in terms of participations in MSCA in Horizon 2020¹⁸¹ were:

- United States (currently at 3.9% of all project participations), with China (2.4%) Australia (0.6%), Canada (0.5%), Argentina (0.5%) completing the top five of Third Countries.

This is almost identical to the US, China, Australia, Canada and Brazil which are the most active Third Countries across all of Horizon 2020, to date. Participations in MSCA account for around 80% of all US participations across Horizon 2020 while for the other top four countries the share is so far around 50% or higher.

The change in the eligibility conditions for automatic funding in H2020 has (for H2020 overall) affected the BRICS countries apart from China and to a lesser extent, Brazil. The United States increased their share of MSCA participations in Horizon 2020, when compared to FP7.¹⁸²

So far, MSCA under Horizon 2020 has funded less researchers who are nationals of Third Countries, when compared to FP7 (24% compared to 31% in FP7). In particular, a significantly smaller relative share of researchers from China and Russia have been supported so far under Horizon 2020. The programme has also seen a slight decrease in relative support for researchers who are US nationals.

¹⁷⁹ If partner organisations are discounted, participations from Third Countries in MSCA drop to 0.1%, and to 1% in MCA.

¹⁸⁰ See also: European Commission (2016), Performance Analysis of International Participation in Horizon 2020. A support study for the interim evaluation of Horizon 2020.

¹⁸¹ Note: no detailed CORDA data on partner organisations in FP7 was made available to ICF.

¹⁸² European Commission (2016), Performance Analysis of International Participation in Horizon 2020. A support study for the interim evaluation of Horizon 2020.

5 Coherence

Coherence refers to how well an intervention works internally and with other interventions to achieve common objectives or as complementary actions –or whether they are potentially contradictory.

5.1 Internal coherence: coherence with H2020

5.1.1 Objectives

The overall H2020 objective is to “contribute to building a society and an economy based on knowledge and innovation across the Union by leveraging additional research, development and innovation funding and by contributing to attaining research and development targets, including the target of 3% of GDP for research and development across the Union by 2020. It shall thereby support the implementation of the Europe 2020 strategy and other Union policies, as well as the achievement and functioning of the European Research Area (ERA).¹⁸³” This will be achieved through three main priorities: excellent science, industrial leadership and tackling societal challenges. The regulation establishing H2020 identifies MSCA as the action leading the following H2020 specific objective: “Provide excellent and innovative research training, as well as attractive career and knowledge-exchange opportunities through cross-border and cross-sector mobility of researchers to best prepare them to face current and future societal challenges”. The MSCA objectives and actions are highly coherent with H2020 objectives.

MSCA is particularly supportive of the international participation objectives of H2020. International (non-EU) participation in H2020 projects has dropped very significantly in H2020 compared FP7. The MSCA projects have the highest number and share of non-associated-countries’ participations in H2020. RISE is the most international (non-associated countries) of H2020; ITNs and COFUND also attract international participants above the H2020 average.¹⁸⁴

Stakeholders approached during the evaluation considered that the reduction of actions under H2020 has contributed to the clarity and coherence of its integrating parts.

5.1.2 Instruments

MSCA is coherent with other H2020 actions. In the view of the evaluator and interviewed stakeholders, however, a degree of overlap exists with the Horizon 2020 SME Innovation Associate Initiative (IAI), that funds the recruitment of doctorate holders in SMEs. Given the commonalities between both initiatives it will be important to ensure the continuing coherence and complementarity between these actions, and consider the incorporation of IAI into MSCA.

Between 10% and 20% of the beneficiaries surveyed for the evaluation –depending on the MSCA action- reported that MSCA was a continuation of funding received under FP7.¹⁸⁵ MSCA has also helped beneficiaries to acquire additional FP7 and H2020 funds post-participation. This is suggestive of the complementarity that exists between these instruments.

¹⁸³ Regulation (EU) No. 1291/2013 347/110.

¹⁸⁴ European Commission (2016) Performance analysis of international participation in Horizon 2020. A support study for the interim evaluation of Horizon 2020. DG Research and Innovation.

¹⁸⁵ Between 60% and 70% of respondents –depending on the action- reported that the MSCA funding was not a continuation of funding received under any other sources (H2020 or non-H2020) or that they did not know whether this was the case.

5.1.2.1 European Research Council

The MSCA programme under FP7 has been previously evaluated as broadly coherent with the European Research Council (ERC).¹⁸⁶ There is no indication that this has fundamentally changed in the current Horizon 2020 period. The ERC shares MSCA's emphasis on the stimulation of excellence and the production of high quality research through the competitive allocation of research funding. Both initiatives are 'bottom-up', or investigator driven. However, the ways in which both initiatives seek excellence varies: ERC does not have mobility requirements associated to it, and does not aim to have a similar impact to MSCA in the training of future researchers (unlike ITNs, which receive the largest share of MSCA's budget). ERC does not address higher education staff outside researchers in a similar way to RISE.

More generally, stakeholders interviewed for this evaluation reported that MSCA funding "encourages researchers to go for larger research projects in the future" (such as ERC grants) and more international grants. The Economisti Associati MSCA study¹⁸⁷ found this effect to be particularly strong for female researchers.

5.1.2.2 European Institute of Innovation and Technology

The MSCA programme under FP7 has previously been evaluated as coherent with the European Institute of Innovation and Technology (EIT).¹⁸⁸ There is no indication that this has fundamentally changed in the current Horizon 2020 period, according to the stakeholders interviewed for this evaluation and the documentary evidence reviewed for this evaluation.

The EIT is supporting five Knowledge Innovation Communities (KICs¹⁸⁹), which include higher education, public and private sector research bodies. According to a study by Ecorys¹⁹⁰, the projects operated by KICs may benefit experienced researchers who had already participated in the MSCA. In this way, MSCA helps to ensure a supply of experienced researchers to implement projects taken forward under initiatives like KICs, complementing those.

5.1.2.3 SME Innovation Associate Initiative

MSCA aims to enhance technological leadership through and entrepreneurship within research, as well as links between universities and industry. This effort is complementary to the existence of an SME instrument in H2020. This instrument, however, focuses on the development of ideas for products, services or processes that are ready to face global market competition. It is not concerned with basic research – one of the areas covered by MSCA-, and does not include a similar focus as MSCA on the development of future researchers.

Some stakeholders interviewed reported a degree of overlap between MSCA and the Horizon 2020 SME Innovation Associate Initiative (IAI): Funding PhD recruitment in

¹⁸⁶ PPMI (2013) 'FP7 Marie Curie Actions Interim Evaluation' Final report. Economisti Associati, Marie Curie researchers and their long-term career development: a comparative study – Final Report, March 2014.

¹⁸⁷ Economisti Associati, Marie Curie researchers and their long-term career development: a comparative study – Final Report, March 2014. P.110.

¹⁸⁸ PPMI (2013) 'FP7 Marie Curie Actions Interim Evaluation' Final report. Economisti Associati, Marie Curie researchers and their long-term career development: a comparative study – Final Report, March 2014.

¹⁸⁹ <https://eit.europa.eu/activities/innovation-communities>

¹⁹⁰ ECORYS (2012), Marie Curie Life Long Learning and Career Development Evaluation. <http://ec.europa.eu/smart-regulation/evaluation/search/download.do;jsessionid=h1ysTJkS1fMPNDyQyLG8XJ1R2ML1pTc06yxsRQyJNJ1q8rkNLLTY!1601440011?documentId=715857>

SMEs.¹⁹¹ However, this initiative is only accessible to SMEs and start-ups established in the EU Member States and H2020 associated countries –not to higher education institutions or other types of companies. The initiative aims to facilitate the integration into those entities of researchers who hold a PhD or equivalent and comply with transnational mobility criteria as defined by MSCA. These become post-doctoral research associates for an initial period of 12 months, and the SME receives an individual grant covering salary and related costs to conduct research for their innovation area. The researchers take part in the business innovation process, learn about industrial innovation and business management skills, and boost their CVs with business experience abroad. The programme will support 90 SMEs in this process. There is a degree of overlap between MSCA and this initiative, as IFs can be post-doctoral fellows that are hosted at an SME for at least a year. MSCA also allows secondments in industry for post-doctoral researchers. However, MSCA IFs cater for a larger group of host organisations, is larger in terms of volume and fellowships can have a longer time-span. It will be important that the Commission ensures the continuing coherence and complementarity between these actions in the future; it would be worth exploring the possible incorporation of the IAI initiative into MSCA due to the commonalities between both.

5.2 Internal coherence of MSCA

According to most stakeholders, on the whole, a coherent set of actions is in place in the programme.¹⁹² This is derived from the programme structure and its attention to different career stages. The MSCA projects aim to develop excellence in research and mobility from doctoral training (ITNs) to more senior positions (IFs). MSCA-IF is not only an action that matches the MSCA objectives per se but also a logical continuation in the opportunities for development offered by ITNs. IFs and ITN are the two MSCA that receive the highest allocation of funds (just under 80% of the MSCA budget in 2016-17).

Research and Innovation Staff Exchanges (RISE) support international and inter-sectoral collaboration through the exchange of research and innovation staff. This is coherent with the emphasis of the other actions on mobility, and with actions that aim to build an organisational environment in European higher education institutions that is more familiar with and conducive to internationalisation.

NIGHT has a specific remit and its activities are differentiated from those of the other actions. NIGHT aims to raise awareness of research careers, and enhance the attractiveness of careers in science.¹⁹³ A small number of stakeholders, while recognising that there is a place for the type of activities that NIGHT funds, raised questions regarding their coherence with other actions –in particular regarding the ways in which NIGHT can help to achieve the objective of developing the “excellence” base of the EU’s science and research. The interim evaluation of MCA noted that NIGHT “remained somewhat distant from MCA”¹⁹⁴. It found “little evidence of the benefits of RN being a part of the Specific People Programme (...) It appears that policy-makers involved in the implementation of a specific action, as well as institutions implementing the projects could imagine RN as a stand-alone action or a

¹⁹¹ <https://ec.europa.eu/easme/en/news/horizon-2020-sme-innovation-associate-funding-phd-recruitment-smes>

¹⁹² FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): Rationale, implementation and achievements, Dr Dragana Avramov, 2015.

¹⁹³ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 –the Framework Programme for Research and Innovation (2014-2020).

¹⁹⁴ PPMI (2013) ‘FP7 Marie Curie Actions Interim Evaluation’ Final report. P. 49; 55; 148-149.

part of other programmes and initiatives in the area of communication about researchers”.

In order to enhance its coherence with other actions, consideration could be given to making the link between NIGHT and research excellence more explicit in the description of the action. Its coherence and synergies with other parts of the programme could be enhanced by continuing to exchange good practice among the national coordinators of the NIGHT and by modifying NIGHT’s narrative in order to present NIGHT as a platform that aims to “showcase” excellent research -in particular excellent research associated with MSCA- to the general public. NIGHT does, on the whole, already perform more strongly as a “showcase” for excellent research than as a mechanism to increase the attractiveness of research careers. The results of the evaluation’s NIGHT survey (N=142) show that a higher proportion of respondents are motivated by a desire to “increase the visibility and popular understanding of researchers’ work” (83%) than by a desire to “increase the attractiveness of research careers” (64%); and whereas 70% of respondents strongly agreed that the events had increased the visibility and understanding of researchers’ work, 47% strongly agreed that the project had increased the attractiveness of research careers.

Some interviewees suggested that there are overlaps between ITN and COFUND, as both accommodate doctoral candidates, but while some suggested that these actions be combined, others did not advocate this given their different objectives. Other interviewees suggested that there is an overlap between IFs and COFUND but the consequences of this overlap were seen differently: while some mentioned that there is clearly a need for IF that justifies the action, others argued that COFUND should incorporate IF, transferring selection to the national level. In the view of the evaluator, COFUND is coherent with the other actions (including IF and ITNs) and the programme objectives in that it aims to stimulate regional, national and international programmes to foster excellence in researchers’ training, mobility and career development, spreading the best practices of the programme, and adding a European dimension to it –see also the section on European Added Value. In FP7 COFUND was reported to have been incoherent regarding the use of salary scales, as different projects could use different scales, but this issue has been addressed.

Some interviewees raised questions regarding other specific aspects of the internal coherence of the programme. A tension was highlighted between MSCA’s objective to stimulate research excellence across Europe and the correction coefficients for researchers’ living allowance employed. Some countries reported that those coefficients combined with high levels of national taxation for MSCA researchers meant that opportunities in some Eastern European countries were less attractive than the opportunities available in other European countries. These propositions are not corroborated by the findings of the Mid-term review of MSCA unit costs, which shows that despite the application of the country correction coefficient, the MSCA allowances for fellows in Eastern European countries are perceived as very attractive, and often constitute a multiple of the salaries received by comparable researchers at the same institution.

RISE was reported as complex in terms of its requirements (a secondment and exclusivity of work on the MSCA project during the secondment); some stakeholders consider that these requirements are not matched with the level of compensation it offers. Long-term secondments may also be considered difficult/ impractical by senior staff who would like to undertake them, but are deterred by the programme requirement not to work on other projects during the secondment period.

5.3 External coherence: coherence with other EU objectives, policies and legal framework

5.3.1 Europe2020

The current EU strategic objectives are formulated in the Europe2020 Strategy. The Europe 2020 strategy was initiated against a background of lower growth and productivity levels following the financial crisis. Europe 2020's ambition is to "come out stronger from the crisis and turn the EU into a smart, sustainable and inclusive economy, delivering high levels of employment, productivity and social cohesion".

The latest Eurostat analysis of the indicators to support the EU2020 Strategy notes that: "Research and development (R&D) and innovation are key policy components of the Europe2020 strategy. Having more innovative products and services on the market addresses two objectives of the strategy's smart growth goal: job creation through increased industrial competitiveness, labour productivity and the efficient use of resources; and finding solutions to societal challenges such as climate change and clean energy, security, and active and healthy ageing"¹⁹⁵. "The importance of R&D and innovation to fulfilling the ambitions of the Europe 2020 strategy is evident in the close interlinkages between them and the strategy's other objectives"¹⁹⁶. The production of innovative products and services through excellent research is embedded in MSCA's specific objectives.

The EU2020 Strategy includes a target to increase investment in R&D to 3% of GDP (public and private). MSCA complements this objective because of its emphasis on excellence and developing human resources in research: to maximise the returns of this investment, Europe needs to "increase (...) the excellence of its public research system"¹⁹⁷.

MSCA is coherent with various Europe2020 flagship initiatives, in particular Innovation Union, A Digital Agenda for Europe (both part of Smart Growth), Resource efficient Europe and An industrial policy for the globalisation era (both part of Sustainable Growth) and an Agenda for new skills and jobs (Inclusive Growth)¹⁹⁸. As an example, the Digital Agenda for Europe¹⁹⁹ emphasises that the best research ideas must be turned into marketable products and services. This aspect is coherent with MSCA's facilitation of sectoral mobility and cross-sectoral collaboration. Research Efficient Europe²⁰⁰ underlines the need to prioritise research and innovation to drive future transitions in energy systems and improve competitiveness. Innovation Union, of which H2020 is a financial instrument, is highly coherent with MSCA. It aims to create an innovation-friendly environment in Europe that enables a smooth transition from great ideas into products and services that generate jobs and growth. Genuine world-class science, that MSCA aims to support, is crucial for achieving this goal²⁰¹. MSCA is

¹⁹⁵ <http://ec.europa.eu/eurostat/documents/3217494/7566774/KS-EZ-16-001-EN-N.pdf/ac04885c-cfff-4f9c-9f30-c9337ba929aa> p.56.

¹⁹⁶ European Commission, Roadmap to a resource efficient Europe, COM (2011) 571 final, (p. 4).

¹⁹⁷ http://ec.europa.eu/research/era/pdf/era-communication/era-communication_en.pdf p.2

¹⁹⁸ For more information on these Flagship initiatives see http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/flagship-initiatives/index_en.htm

¹⁹⁹ <https://ec.europa.eu/digital-single-market/en/europe-2020-strategy>

²⁰⁰ <https://ec.europa.eu/energy/en/topics/technology-and-innovation>

²⁰¹ http://ec.europa.eu/research/era/pdf/era-communication/era-communication_en.pdf DG Regional and Urban Policy (2014) Enabling synergies between European Structural and Investment Funds, Horizon2020 and other research, innovation and competitiveness-related Union Programmes. Guidance for policy-makers and implementing bodies. Luxembourg, Publications Office of the European Union.

coherent with other initiatives associated with Innovation Union, including international cooperation actions to facilitate mobility (scientific visas, scientific cooperation activities) and stakeholder cooperation activities such as European Innovation Partnerships, which aim to bring stakeholders together to step up research and development efforts –in line with MSCA objective on cross-sectoral mobility and collaboration.

5.3.2 New Skills Agenda for Europe

EU's R&D actions are complementary to the EU's targets on increasing employment as investment in R&D results in jobs in business and academia, increasing the demand for scientists in the labour market and also creating new products and markets through research. The New Skills Agenda for Europe²⁰² aims to provide the right training and support to people in the European Union, and to make better use of the skills that are available –which links with MSCA in terms of its focus on skills development and training, and on the productive use of skills through cross-sectoral mobility and collaboration. The New Skills Agenda for Europe argues that European tools such as the European Qualifications Framework can help to attract highly-skilled researchers and professionals from outside the EU to secure the skills that are needed in Europe, which is aligned to MSCA's emphasis on facilitating researchers' mobility.²⁰³

5.3.3 European Research Area

There are strong synergies between the objectives of MSCA and those of the European Research Area (ERA).²⁰⁴ MSCA aims to have a structuring impact on the ERA –for example by setting standards for research training. MSCA is coherent with the ERA objective of creating an open labour market for researchers in the Union, through its stimulation of researcher mobility.

ERA's priorities²⁰⁵ are closely related to MSCA (in particular its geographical mobility elements): this is the case of the development of more effective national research systems, optimal transnational cooperation and competition, open labour markets for researchers and the development of the international dimension outside the ERA. For example, under its priority 3 (open labour market for researchers) "the ERA process asserts that researcher mobility contributes to excellence"²⁰⁶. The ERA 2015-2020 Roadmap emphasised this commitment by stating that: "the goal is a truly open and excellence driven ERA in which highly skilled and qualified people can move seamlessly across borders, sectors (e.g. academia and industry) and disciplines to where their talents can be best employed to advance the frontiers of knowledge and support innovation throughout Europe and beyond"²⁰⁷. These mobility elements are central to MSCA objectives; the Commission has presented the volume of mobility of researchers under MSCA as an example of progress in building the ERA.²⁰⁸

²⁰² European Commission (2016) Communication: A new skills agenda for Europe –Working together to strengthen human capital, employability and competitiveness. COM (2016), 381 Final.

²⁰³ EUROSTAT (2015) Smarter, greener, more inclusive? Indicators to support the Europe 2020 Strategy. Luxembourg: Publications Office of the European Union.

²⁰⁴ COM(2012)392 final, A Reinforced European Research Area Partnership for Excellence and Growth http://ec.europa.eu/research/era/pdf/era-communication/era-communication_en.pdf

²⁰⁵ http://ec.europa.eu/research/era/pdf/era_progress_report2016/era_progress_report_2016_technical_report.pdf

²⁰⁶ http://ec.europa.eu/research/era/pdf/era_progress_report2016/era_progress_report_2016_technical_report.pdf

²⁰⁷ ERAC Secretariat (2015) European Research Area (ERA) Roadmap 2015-2020. Brussels, 20th of April 2015. p.11.

²⁰⁸ http://ec.europa.eu/research/era/pdf/era-communication/era-communication_en.pdf p.4

MSCA is coherent with the internationalisation cooperation objective of the ERA –and a “vital cross-cutting and integral part²⁰⁹” of the ERA implementation process. In 2015, Associated and Third countries accounted for 7.1% and 12.6% of total participations in MSCA compared with Horizon 2020 averages of 7.4% and 2.0% respectively. This is achieved through the Global Fellowships in IF, the ITN and also through RISE, where the number of secondments to non-EU countries is almost three times that of intra-EU secondments. ERA monitoring reports acknowledge that the financial and administrative support required to maintain international partnerships is insufficient in many national contexts. MSCA aims to contribute to addressing this gap.

Various ERA progress indicators are closely aligned with MSCA, and MSCA actively contributes to them –e.g. share of doctoral candidates with a citizenship of another EU Member States, international co-publications with non-ERA partners, number of public-private co-publications, share of innovative firms cooperating with HEIs or public/private research institutions, or research excellence (based on Journal Citation Reports).

MSCA is coherent with (and has helped to promote) various tools and instruments that support the development of the ERA, such as the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, Principles for Innovative Doctoral Training and EURAXESS.²¹⁰ Indeed, the MSCA has widely promoted the EU Principles for Innovative Doctoral Training, which foster excellence and a critical mind-set and identify the need to provide young researchers with transferable skills. These are aspects that are closely related to MSCA’s emphasis on excellence and cross-sectoral mobility.

An analysis of objectives and instruments - from the FP7 Marie-Curie Actions interim evaluation²¹¹- reveals coherence of efforts between the MSCA and EURAXESS, a Commission-funded, pan-European initiative for researchers. The two initiatives aim at providing European researchers with better mobility, career and personal development opportunities. They differ, however, in terms of the instruments used to achieve this goal: while the MSCA provide funding for research mobility, EURAXESS provides practical information for researchers moving from one country to another.

5.3.4 ET2020

Education and Training 2020²¹² (ET2020) has as one of its four strategic objectives the enhancement of creativity and innovation, as key drivers of sustainable economic development. As part of this objective, ET2020 underlines the need to ensure partnerships between the worlds of enterprise, education and research through cross-sectional collaboration. MSCA’s specific objectives are coherent with this strategic objective, insofar as its objectives support the stimulation of cross-sectoral collaborations and sectoral mobility. Moreover, MSCA goals are coherent with the ET2020 higher education attainment goals, because “Public investment in R&D generates the knowledge base and talent that higher education (...) need(s)”.²¹³

²⁰⁹ European Commission’s 2012 Communication 'A Reinforced European Research Area Partnership for Excellence and Growth', COM(2012) 392. P.4

²¹⁰ FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): Rationale, implementation and achievements, Dr Dragana Avramov, 2015.

²¹¹ PPMI (2013) 'FP7 Marie Curie Actions Interim Evaluation' Final report.

²¹² [http://eur-lex.europa.eu/legal-](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009XG0528(01)&from=EN)

[content/EN/TXT/PDF/?uri=CELEX:52009XG0528\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009XG0528(01)&from=EN)

²¹³ <http://ec.europa.eu/eurostat/documents/3217494/7566774/KS-EZ-16-001-EN-N.pdf/ac04885c-cfff-4f9c-9f30-c9337ba929aa>

5.3.5 Directive 2016/801

The EU recently adapted its legal framework for non-EU students and researchers through the Directive (EU) 2016/801 on the conditions of entry and residence for the purposes of research, studies, training, voluntary service, pupil exchange schemes or educational projects and au pairing²¹⁴, which will make it easier to attract and retain talented researchers to Europe. The Directive aims to promote the EU as an attractive location for research and innovation and advance in the global competition for talent and growth, in line with MSCA objectives.

5.4 Funding instruments and tools

There are various EU funding instruments and tools that interact with MSCA. The majority of stakeholders interviewed for this evaluation reinforced the message that MSCA is highly coherent with current EU instruments, complementing these without significant overlaps as reviewed in more detail below.

5.4.1 Erasmus+

Erasmus+, the main education programme of the EU, is coherent with MSCA as education and research are closely related. Erasmus+ emphasises mobility –including the mobility of students, early stage researchers (PhD candidates) and staff working in higher education institutions- and cross-sectoral work. Erasmus+ funds mobility for both teaching and training. Training periods can include professional development courses and specific competence-building events abroad (at education institutions or other relevant organisations operating outside of education), but their duration is much shorter than the training funded under MSCA for teaching and non-teaching staff (staff training duration under Erasmus+ cannot last for more than 2 months). The situation regarding students is somewhat different to staff, as students can undertake up to 12 months mobility during their doctoral studies; some doctoral scholarships are still being awarded by Erasmus Mundus Action 2 partnerships, and Erasmus Mundus Joint Doctorates (action 1) also award EU-funded fellowships for doctoral programmes, although these have different characteristics to MSCA funded doctoral programmes.²¹⁵ The Jean Monnet part of Erasmus+ aims to promote excellence in EU studies in higher education around the world, with an emphasis on the study and research on EU integration. Its aims and scope, therefore, are restricted compared to those of MSCA.

The evolution of MSCA from FP7 to H2020 was well received by the stakeholders approached during this evaluation, as some of FP7 funding was considered redundant with what was offered by the Erasmus Mundus programme. H2020 substantially advanced coherence and complementarity with Erasmus+ compared to FP7, according to these stakeholders.

5.4.2 Investment plan for Europe and ESIF

The Investment Plan for Europe²¹⁶ signalled the importance of investing in Innovation, Research and Development. The interim evaluation of the FP7 Marie Curie action²¹⁷ concluded that the European Regional Development Fund (ERDF) focused on investment in infrastructure, whereas MSCA complemented this investment by focusing on the human resources aspects of research. This complementarity continues

²¹⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016L0801&from=EN>

²¹⁵ See

http://eacea.ec.europa.eu/Erasmus_mundus/results_compendia/selected_projects_action_1_joint_doctorates_en.php

²¹⁶ https://ec.europa.eu/priorities/sites/beta-political/files/factsheet3-what-in_en.pdf

²¹⁷ PPMI (2013) 'FP7 Marie Curie Actions Interim Evaluation' Final report.

to be present in relation to European Structural and Investment Funds (ESIF)²¹⁸, given that in order to attract leading researchers world-class infrastructures are needed, and in order to make the most of investment in infrastructures, world-class researchers are required. Interviewees for this evaluation reinforced this view.

Other differences between H2020 (including MSCA) and ESIF are well delimited²¹⁹: MSCA is non-territorial/ transnational and directly managed by the EU, whereas ESIF is co-managed and takes into account geographic specificities in the allocation of its funding. MSCA is project-based and based on excellence whereas ESIF is based on capacity-building in specific eco-systems and prioritises cohesion. It is possible to foresee ESIF investments in support of COFUND, for instance in the form of investment in infrastructures, large equipment (ERDF) or training and networking (mainly ESF).²²⁰

Synergies with ESIF through the COFUND action have materialised during the implementation of MSCA, as illustrated by various examples. Under H2020 –for instance-, EUR9.5 million were awarded to the Welsh Government to set up a fellowship programme for 90 experienced researchers recruited from abroad. The programme is supported by an EU contribution through MSCA-COFUND, the European Regional Development Fund (ERDF) as well as by various regional sources of support, including the Welsh government. Best practices in the use of such synergies, and more formal mechanisms to develop them, should be identified and promoted to increase their uptake.²²¹ 6% of COFUND participants who answered the evaluation's online survey reported that their COFUND project had helped them to acquire ESIF funds.

5.5 External coherence: coherence with Member States' interventions

5.5.1 Objectives

MSCA is complementary to the objectives of regional and national funding for the development of research excellence in most European countries. Stakeholders interviewed in the course of this evaluation mentioned that national funding for doctoral programmes/training normally does not have mobility requirements attached to it and tends to have as its main objective the development of national research capacity. It tends to fund mainly or exclusively citizens from (or long-term residents in) that country.

Policy-makers from some countries reported in their interviews that opportunities and funds for researchers in their countries are limited and that MSCA is the best programme available for national researchers to improve their careers and enhance their skills internationally. MSCA also contributes to ensure that researchers from countries that do not have resources to or place little priority in international mobility can benefit from mobility experiences.

²¹⁸ See also ECORYS (2012) FP7 Marie Curie Life-long Training and Career Development Evaluation: Individual Fellowships and Co-Funding Mechanism.

²¹⁹ DG Regional and Urban Policy (2014) Enabling synergies between European Structural and Investment Funds, Horizon2020 and other research, innovation and competitiveness-related Union Programmes. Guidance for policy-makers and implementing bodies. Luxembourg, Publications Office of the European Union.

²²⁰ Example provided in DG Regional and Urban Policy (2014) Enabling synergies between European Structural and Investment Funds, Horizon2020 and other research, innovation and competitiveness-related Union Programmes. Guidance for policy-makers and implementing bodies. Luxembourg, Publications Office of the European Union.

²²¹ MSCA Advisory Group Report June 2016

5.5.2 Instruments

The differences between national instruments for doctoral training and MSCA reflect their differences in objectives. National programmes often lack the universality (for example focus on bilateral exchanges or target specific groups of researchers) and flexibility of MSCA in their structure.²²² National schemes often use MSCA as a reference point with regards to the development of excellent research, as noted during the interviews undertaken for the evaluation. In some countries, there is also a perceived lack of funding. As an interviewee put it:

"In my country, there is very limited funding for postgraduate research abroad" – National policy-maker and programme officer, Council for Science and Technology.

The situation regarding post-docs is somewhat different, in that the majority of schemes are accessible to foreign researchers.²²³

Some overlap with nationally funded mobility programmes was reported by a minority of stakeholders (e.g. Research Council schemes in SE; DAAD and Humboldt Foundation fellowships (DE); Rubicon for postdocs to spend a period abroad (NL); "Navrat" programme in CZ –to encourage CZ researchers working abroad to return to the CZ). These overlaps, however, were not reported as particularly problematic given the overall differences between these programmes and MSCA.

On the whole, the evaluators' benchmarking analysis with national programmes²²⁴ suggests that national schemes supporting mobility of researchers have a different scope to that of MSCA. They often support either young researchers or senior researchers, but rarely both types (exceptions to this pattern were found in the Czech Republic and France). Most often, the national programmes analysed aim to attract highly experienced researchers in order to build on their experience and capitalise on their visibility and capacity to capture funding to conduct research in the country, which contrasts with MSCA's emphasis on skills development, and the development of future generations of researchers. Most often, the duration of mobility offered by national schemes is shorter than the duration offered by MSCA.

National programmes tend to have a lower degree of flexibility in regard to the geographical scope of the hosting institution. Eligibility rules for outward mobility funding often require that the sending institution be based in the country, or the applicant researcher to be a citizen/resident. With reference to inward mobility, many of these programmes do not have restrictions on the nationality of the applicants, however they do require the host institution to be based within the funding country. National schemes may also focus on bilateral exchanges such as the State Scholar Foundation agreements between organisations in Greece and Germany.

MSCA additionally offers a greater emphasis on inter-sectoral research than most national programmes. A number of these programmes do not allow for-profit

²²² PPMI (2013) FP7 Marie Curie Actions Interim evaluation. Final Report.

²²³ <http://www.scienceeurope.org/wp-content/uploads/2016/10/20160922-Survey-Postdocs-Final.pdf>

²²⁴ For this analysis searches were conducted that resulted in a long-list of around 30 programmes that enabled researchers' mobility. Of these, ten were selected based on their characteristics for a more in-depth review through desk-research, complemented in some cases with interviews with project coordinators or programme managers. The programmes reviewed included Austria's Lise Meitner programme, Czech Republic's Návrat initiative, Denmark's Niels Bohr Professors, Estonia's Mobilitas+, France's IDEX, Germany's Georg Forster Research Fellowship, Italy's Bando MAECI and Sweden's Individual mobility for innovation and societal gains –programme within the knowledge triangle. In addition, the Chinese Academy of Science President's International Fellowship Initiative was also reviewed as an example of a related programme in an emerging country.

organisations to host the mobile researchers supported. Some programmes are focussed only supporting mobility into HEIs, such as the “Bando MAECI” programme in Italy.²²⁵

Interviewees for this evaluation also mentioned how national re-integration programmes enable researchers who have gained strong competencies through participation in MSCA to return to their countries of origin, underlining complementarities between both types of intervention. Examples of such reintegration programmes includes the “Návrat” programme in the Czech Republic to encourage Czech researchers working abroad to return to the Czech Republic and/or experienced researchers that are foreign nationals to take up a position in a research organisation in the Czech Republic, and the “Lise Meitner” programme in Austria, which facilitates reintegration.

There is a high degree of synergy, in particular, between national/ regional level initiatives and COFUND.²²⁶

Box 5: COFUND case studies

The COFUND project HERMES builds on and extends the Georg Forster Research Fellowship Program by Alexander von Humboldt Foundation. This programme is aimed at excellent researchers from developing and transition countries, and funds research projects that contribute to transferring knowledge or methods to their respective home countries and thereby strengthen science and research in those countries. With funding from the German Federal Ministry for Economic Cooperation and Development 40- 50 fellowships could be supported. After being successful in COFUND, the number of fellowships was raised to 99 in 2014, meaning an increase of more than 100% compared to 2013, and new features were added to the programme –for example improved pension and family benefits- which made it more competitive. COFUND requirements also led to changes in the selection process including new standards relating to ethical aspects.

[Source: HERMES case study]

The POLONEZ COFUND project coordinated by NCN Poland (Narodowe Centrum Nauki / National Science Centre) supports inter-sectoral, incoming geographic mobility by allowing researchers that are not residing in Poland to take-up fellowships at Polish research organisations. The fellows are postdoctoral researchers conducting basic research, are not permanently employed and have not been working in Poland in the three years prior to the call. Case study research suggests that without COFUND, the programme would not exist, due to lack of resources and administrative support. This programme is more competitive than other national programmes in terms of researchers’ salaries, visibility and brand, and these are contributing factors that enable the programme to attract excellent researchers.

[Source: POLONEZ case study]

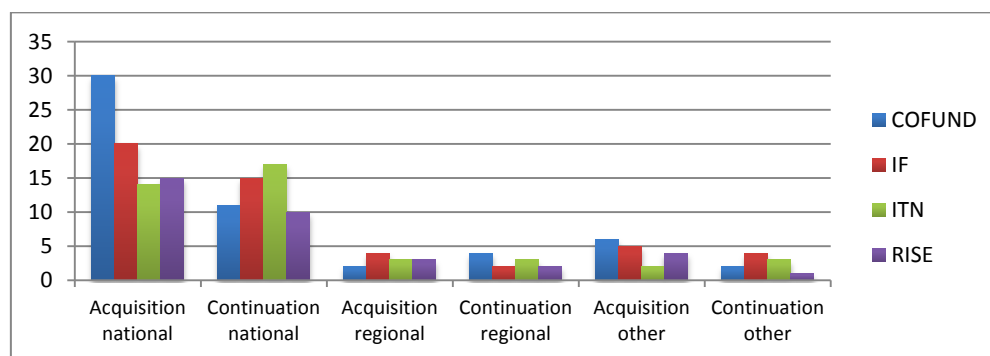
²²⁵ There are some national programmes that support activities that resonate with some of the characteristics of the MSCA’s ITNs. This is the case of the “Initiatives of Excellence” (IDEX) in France. This programme supports the formation of small networks of academic and industry partners geographically centred around the universities and public research organisations, and enables mobility and fellowships to foster internationalisation of the cluster. However, the scope these activities do not fully correspond with the scope of MSCA’s ITNs, as they not have a similar emphasis on training to acquire new skills.

²²⁶ ECORYS (2012) FP7 Marie Curie Life-long Training and Career Development Evaluation: Individual Fellowships and Co-Funding Mechanism.

MSCA also coexists with national schemes that do not stimulate mobility or collaboration with industry, and some high level researchers may be more attracted towards those schemes than to MSCA. This is the case, for example, of the UK's Research Council funding for Doctoral Training Centres, its "Future Leaders" scheme (that targets early career researchers post-PhD) and its funding for research projects (generally for more established academics) and large investments (research centres, groups and networks). Research Councils also fund Knowledge-Transfer Partnerships to exchange knowledge, skills and technology with non-higher education institutions. However, the evaluators have not come across any evidence that suggests that this competition has negatively affected the calibre of MSCA candidates, or has been detrimental to national programmes.

The coherence and complementarity between MSCA and national funds can be seen in that a high proportion of MSCA beneficiaries reported that MSCA had helped them to acquire non-MSCA related national research funds. This is particularly the case for COFUND and IF beneficiaries.

Figure 40. Extent to which participation in MSCA has been a continuation of previous funding or has helped beneficiaries to acquire additional funds (national, regional or other) after the completion of the project



Source: ICF survey of beneficiaries. N= 2970 (COFUND= 53; IF= 1127; ITN= 1031; RISE= 759). Other programmes include charities, philanthropic, industry, etc.

The national benchmarking undertaken for this evaluation revealed that higher education institutions are increasingly defining strategies aimed at associating European funding (e.g. MSCA) with other sources of funding to reinforce their international visibility (French and Estonian case). From that perspective, MSCA is both a label that provides HEIs with international recognition and a cornerstone of their international strategies, which complements other actions that they adopt to develop their research excellence.

There are other areas in which coherence and synergies with national initiatives have been developed. Complementarity with national funding programmes has been enhanced through the introduction, in 2016, of a Seal of Excellence, which is awarded to IF proposals which score 85% or above but for which there is insufficient funding through the MSCA budget. The Seal of Excellence provides researchers who have achieved this score with recognition for the quality of their proposals; it can be used by these researchers and the hosting institutions with whom they applied to seek alternative funding sources –for example at regional and national level, including through the use of ESIF. Funding bodies at regional or national level will be able – on a voluntary basis – to rely on the MSCA evaluation when making funding decisions. Drawing on ESF, Cyprus and the Czech Republic have introduced a funding scheme for recipients of the Seal of Excellence while Croatia, Poland and Slovenia have measures in the pipeline.

In France, a national instrument supports consortia drafting a proposal for EU programmes, with up to EUR30,000. Researchers have made use of this instrument to draft MSCA projects –in particular for the coordination of ITNs.

Finally, some interviewees reported that the 36 months maximum period does not match programme structures in some universities –where doctoral studies are designed as 4-year programmes-, and this deters participation due to difficulties to find funding for the 4th year of study and reduces the incentives of institutions to take part in the programme (ITNs).

6 EU added value

EU added value refers to the value resulting from EU interventions that is additional to the value that would have resulted from interventions initiated at regional or national levels, by both public authorities and the private sector.

6.1 Analysis of EU added value

National stakeholders interviewed suggested that the MSCA programme provides greatest EU added value in the area of 1) international mobility and 2) research excellence and training. As regards international mobility, stakeholders suggested that the programme offers more extensive options for researchers to move abroad (MT, SE, IE, UK, HU, SK, CZ, BE, EL, FI, NL, LT, RO). The second area of added value highlighted by national stakeholders related to the excellent research and research training that the programme supports (MT, BG, SE, IE, UK, HU, SK, DE). In the view of stakeholders, the programme offers a quality label for excellent research. In addition, the international training and supervision offered within MSCA projects is considered to be of extremely high level and often adds value to training and supervision available under national schemes, according to stakeholders.

Other areas of added value mentioned by national stakeholders were improvements in institutional HR and recruitment practice (AT) and its favourable funding conditions (FR).

6.1.1 MSCA Added value compared to national programmes

Our benchmarking with national programmes funding incoming and outgoing researcher mobility suggests that MSCA provides distinct added value vis-à-vis national programmes.

One of the frequently mentioned differences between MSCA programmes and national programmes is the experience of the targeted researchers. MSCA is open to less experienced researchers, while national programmes in e.g. Austria and the Czech Republic require researchers to be at least post-docs or already have considerable foreign experience in order to be eligible. In Italy's Bando MAECI, there is also an age limit for applying to the national programme examined. Furthermore, also the organisations eligible to apply vary between the national programmes and MSCA.

Another factor that differs MSCA programmes from the national programmes examined is the programme's focus on the fellows' career development. While MSCA clearly has a strong objective to foster fellows' career development, many national programmes see this as the secondary goal. An example is Germany where the national programme primarily focuses on the fellow as a change agent for policy development and where the fellow's positive career impacts are only potential side effects.

Also the clear and mandatory focus on intersectoral mobility as well as interdisciplinary collaboration in MSCA is weaker, and even missing, in some of the national programmes, especially Germany and China. The degree of international collaboration and mobility differs across national programmes, whilst the focus on international mobility and cooperation is very strong in MSCA. Many of the national programmes have a focus on the researcher to return to their country of origin and (re-)integrate into the country's research sector (e.g. in Germany and Czech Republic), whilst MSCA supports mobility in all 'directions'.

Another aspect that differentiates MSCA from national programmes is that MSCA has an extended geographic scope as well as a larger variety of funded actions as compared to the national programmes. While national programmes appear to either focus on creating networks and partnerships between associated institutions in the

research sector (like in the case of China and the Chinese Academy of Science), or focusing on single-participant projects (like in the case of Czech Republic), MSCA focuses on creating stronger networks between researchers and other actors in the economy as well as supporting multi-participant projects (in some actions).

Finally, a particular added value of MSCA is the funding offered for researchers with family, and support to organisations participating in MSCA to cover management and indirect costs.

As for individual MSCA projects, the ITN programme was the programme that was most often cited as providing added value. The quality of training and supervision in ITN projects was particularly highlighted by national stakeholders (DE). Case studies show that the added value of MSCA further results from the cross-border networking activities offered by the projects. This capacity to bring together different stakeholders with different points of view is not unique to MSCA, but MSCA offers the possibility to have partners in several countries which is not the case with national programmes which are most often based on bilateral cooperation.

Insights on the EU added value of individual actions drawn from case studies conducted are summarised in the box below.

Box 6: Case studies – EU added value

COFUND Case study: HERMES/Georg Forster Fellowship

The added value from the COFUND funding in Germany seem to be both quantitative and qualitative. Firstly, MSCA funding enabled doubling the number of fellowships funded in 2014 compared to the previous year. Secondly, besides from funding more fellows, the COFUND funding also enabled the Alexander von Humboldt Foundation to offer the fellows a number of additional social benefits. COFUND's family support appears indeed to be unique and highly valued by the fellows, as it enables researchers to bring families with them when relocating.

IF Case studies: Integrated Bio-Electrochemical Production of Ethylene through CO₂ sequestration (BIO-ELECTRO-ETHYLENE) and Milk Banking And The Uncertain Interaction Between Maternal Milk And Ethanol – MUIMME MSCA-IF-EF-CAR - Car – Career Restart panel

The coordinator of the BIO-ELECTRO-ETHYLENE project thought of MSCA as particularly appealing due to its openness to applicants outside of the academia, both in terms of professional and national background. Albeit the BIO-ELECTRO-ETHYLENE project might have gone ahead without MSCA funding, the MSCA IF was said to have attracted a unique calibre of researchers to the coordinating institution, which would not have been possible using other available funding. Moreover, the international aspect of the fellowship and its flexibility in terms of host institution and location of the fellowship, was a further added value of the MSCA fellowship according to the research fellow interviewed.

The MUIMME project coordinator highlighted that MSCA funding enabled a fellow to return to academia and restart her research career, as well as allowing the coordinator to share her experience and knowledge through mentoring a fellow. The publications produced within the MUIMME project as well as the international research collaboration in the project are two other very important and real added values mentioned.

ITN case studies: MICACT and Minilubes

Interviewees in both projects mentioned the synergies of working along with an international network as a core added value of the MSCA programme, enabling exchange of contacts, experiments, discussion of results, long-term collaborations,

multi-country mobility and the creation of international networks at an early stage of fellows' careers. Furthermore, for interviewees involved in the MICACT project the prestige of MSCA funding and the quality stamp that comes with it facilitates winning follow up funding, and fellows' involvement in MSCA was said to be appreciated among future employees, compared to other projects. Finally, fellows in the MICACT project also mentioned that the international network and the structured training was unique compared to other PhD-programmes.

With regard to the EU added value of the NIGHT programme, a majority of survey respondents stated that their participation in the European Researchers' Night project enabled their organisation to involve a large number of younger people in the implementation of the project compared to previous or other events: 53% said that this was true to a large extent for young people at primary education age; 55% that this was true to a large extent for young people at secondary school age, and 51% that this held true to a large extent for young adults (18+).

Some respondents nevertheless highlighted some comparable events to take place nationally such as the Hungarian Month of Science which takes place in November. Moreover, there did seem to be a greater proportion of researchers agreeing that there had been, to a moderate extent, discussions taking place at the local and regional (35%) and national (27%) about the importance of promoting research careers which had been triggered by the NIGHT programme.

6.1.2 Project continuation in the absence of MSCA support

To explore added value reported in the online surveys, two type of survey questions are relevant: i) questions generically exploring the benefits of MSCA and ii) questions explicitly addressing the additional value of EU support. Because of the more direct link with the issue of additionality, the latter questions are analysed in more detail in this section, exploring variations related to type of program, action, panel, organizations, etc.²²⁷

Questions addressing the additional value of EU support often require respondents to think about a hypothetical situation, i.e. "what would have happened without EU support?". Hence, these questions were also included in a questionnaire to a comparison group of organisations which were unsuccessful in applying for MSCA funding. These organisations have experienced the *real* situation of not receiving MSCA support. Responses from the comparison group were therefore used to corroborate the perceptions of respondent from funded organizations, and provide a *real life* counterfactual scenario.

The most important impact of MSCA is arguably to allow a project to exist at all. In this respect, the large majority of respondents argue that they would have not proceeded the project without EU support (82% of 'no' vs 18% of 'yes' - 'I don't know' responses excluded).²²⁸ Even among those stating that they would have proceeded with the project, only a small share of them would have continued with the same number of partners and activities (21% of those stating they would have proceeded) or with the same budget (24%).²²⁹ Hence, for less than 4% of respondents from the

²²⁷ 'missing' and 'I don't know' responses were not considered in the analysis

²²⁸ This figure is rather similar to what claimed by comparison group respondents (74% 'no' vs 26% 'yes'). Source: MSCA evaluation - IF, ITN, COFUND, RISE Organisations – Question: Would you have gone ahead with your project in the absence of any funding from the MSCA programme? and Survey of comparison group organisations – Question: Did you go ahead with your project after your application to the MSCA programme was rejected?

²²⁹ 68% of respondents claim it would have reduced inter sectoral mobility and 49% cross border mobility.

group of funded organisations, the project would have gone ahead and without meaningful changes to scale or scope.

The proportion of funded respondents that state they would have abandoned the projects does not vary depending on the role of the organization (beneficiaries / coordinator), nor the role of the respondent. Variations in responses can be observed in terms of country of respondent and

- Across the two framework programmes;
- Across types of actions;
- Across different scientific panels; and
- Across different types of organisations.

However, if variations in responses are explored including all main covariates in a multilevel regression model,²³⁰ then none of the observed variations in responses is found to be significant.²³¹ Notably, there was no significantly higher added value of MSCA in organisations which indicated EU funding as an important source of funding.

*The only significant variations regards respondents from Germany and United Kingdom, which respectively displayed a lower and a higher probability to have abandoned the project compared to respondents from other countries.*²³²

Looking at the *real case* of unsuccessful applicant organisations, the patterns from the beneficiary survey are confirmed. The added value of MSCA support is highest for ITN projects. (Table 52).

Table 52. Added value of EU funding, responses from organisation which were unsuccessful in their MSCA application

Control group Org: Did you go ahead with your project after your application to the MSCA programme was rejected?	COFUND	IF	ITN	RISE/IA PP/IRSES	NIGHT	Total
Yes	33%	30%	15%	30%	33%	22%
No	67%	66%	81%	62%	50%	73%
Don't know	0%	4%	4%	8%	17%	4%
Total (Respondents)	100%	100%	100%	100%	100%	100%

²³⁰ In this case, respondents (level 1) are nested into countries (level 2). Multilevel models disentangle variance that is due to individual and contextual factors and ultimately computes more accurate coefficients. See: Snijders, T. B., Bosker, R. R., 2012. Multilevel analysis: An introduction to basic and advanced multilevel modelling. Second edition.

²³¹ No variation found to be significant at 0.05 p-value. Variations by country may in fact be due to a composition effect. For instance, some countries have more projects in COFUND and other in RISE. Thus, differences in country responses is not truly related to country traits but to the type of action.

²³² A multilevel regression including other covariates allows to find that despite the share of 'no' is quite variable across countries, only for these two systems it is significantly different. The share of 'would have not continued' is 93% for UK and 71% for Germany.

Source: Questionnaire Control Group organisations, Q26: Did you go ahead with your project after your application to the MSCA programme was rejected? 4 699 valid responses.

Relating these answers to the discussion about the appropriateness of the programme budget in section above, estimates suggest that in Horizon 2020 so far, high-quality proposals equalling EU funding of around EUR9.5 billion did not go ahead in the absence of MSCA support.²³³

Only 6% of all comparison group respondents indicated that their project went ahead without significant changes in the absence of MSCA funding. Projects in the comparison group which were implemented in absence of EU funding generally underwent significant changes to the project partnership, a reduction in international orientation as well as (in the case of ITN projects) a reduction in the number of researchers supported.

Notably, the majority of COFUND projects which went ahead without MSCA funding suffered a reduction of training opportunities for fellows and reduced levels of cross-border mobility, suggesting that in the view of survey respondents MSCA has a significant impact on the training opportunities, and consequently quality, under the co-funded initiatives. Based on these survey responses, COFUND therefore has strong added value regarding the aforementioned aspects of national and regional programmes supported.

The table below provided further detail on the nature of changes the project would have/has undergone in absence of MSCA funding.

Table 53. Nature of changes to projects that would have/have gone ahead without MSCA funding

Control group: If you have gone ahead with your project with changes to project activities and partners, how did the project go ahead without MSCA funding? (multiple answers)	COFUND	IF	ITN	RISE	TOTAL
With reduced training opportunities for project team members (fellows and other researchers)	83%	67%	69%	66%	67%
With reduced levels of cross-border mobility of project team members (fellows and other researchers)	100%	59%	69%	71%	64%
With a smaller number of fellows	100%	52%	71%	60%	60%
With a reduced number of outputs (scientific publications, patent applications, etc.)	50%	57%	54%	71%	57%

²³³As of January 2017, High quality proposals worth EUR 13 billion were unsuccessful in winning funding under Horizon 2020. Using survey responses from unsuccessful applicants, 73% of unsuccessful proposals seem to not be implemented at all after failing to win EU funding, resulting in a loss of projects worth around EUR 9.5 billion so far.

Control group: If you have gone ahead with your project with changes to project activities and partners, how did the project go ahead without MSCA funding? (multiple answers)	COFUND	IF	ITN	RISE	TOTAL
With fewer academic partners	50%	40%	65%	71%	51%
With fewer international partners	67%	40%	58%	60%	48%
With a reduced level of inter-disciplinarity of research activities	50%	42%	52%	54%	46%
With reduced levels of inter-sectoral mobility of project team members (fellows and other researchers)	67%	37%	54%	57%	44%
With fewer "non-academic" partners	17%	15%	55%	43%	31%
Other changes	17%	7%	10%	6%	8%

Source: Survey of Control Group organisations– Question 29: If you have gone ahead with your project with changes to project activities and partners, how did the project go ahead without MSCA funding? (please choose all that apply): There were 699 responses to this question. Top three types of changes are shaded in blue.

6.1.3 Retaining talent

Almost one third of organisations (28 per cent) report that MSCA programmes helped to retain excellent researchers (both European and non-European) who would have otherwise left Europe.

The capability to retain talents thanks to MSCA support is stronger for IF and COFUND (41 per cent and 38 per cent respectively) than ITN (22 per cent) and RISE (17 per cent).²³⁴

Differences by panel and country are negligible (not shown here). This finding suggests that MSCA benefits in terms of retaining talents in Europe is similar in all countries, with no remarkable difference for instance between more or less affluent research and higher education systems. This result is interesting considering recent evidence that competition for talents is asymmetric and tends to favour more affluent countries.²³⁵

6.1.4 Training and Career

As shown in section 4, MSCA contributes to the quality of training offered at participating organisations and impacts fellows' career development, and there is a European dimension to this impact:

²³⁴ See Table 51 for details.

²³⁵ Lepori, B., Seeber, M., & Bonaccorsi, A. (2015). Competition for talent. Country and organizational-level effects in the internationalization of European higher education institutions. *Research Policy*, 44(3), 789-802.

- Section 4 presents evidence that MSCA contributes to the implementation of the Principles for Innovative Doctoral Training, for example in relation to the quality of supervision and training for ESR and their exposure to industry workplaces during doctoral training;
- Organisations participating in MSCA are more often compliant with the Charter and Code in relation to transparent and merit-based recruitment. Moreover, between one quarter and one third of participating organisations report that MSCA has led to improvements in relation to various elements of the Charter and Code. This suggests that MSCA encourages and to some extent rewards compliance with the Charter and Code;
- Building and strengthening international networks is a strength of MSCA, contributing to the ERA;
- Evidence from interviews indicates that MSCA is also contributing to the ERA by creating a quality label that is recognised across Europe, thereby facilitating recruitment of excellent researchers across borders:
 - “[MSCA] helps the best researcher by bringing a kind of label on their profile – we can consider them as a part of an international elite.” - Human Resource expert.
 - “The high reputation of MSCA helped me to acquire a position as Full Professor. [My participation in] ITN was highlighted by the committee, showing the impact of ITNs on the career of the participants.” - Former ITN fellow.

MSCA is not only contributing to the quality of existing training, but also encourages the development of training tailored to the needs of MSCA fellows that would not be available otherwise. 17% of COFUND, IF and ITN organisations state that the training MSCA fellows receive is only partly accessible to other researchers in the organisation and 9% of organisations indicated that their training is not accessible for researchers that are not funded through MSCA.

Training offers that are reserved for MSCA fellows most often concern industry or market related topics such as ‘Marketing and sales’ and ‘Product development’. On the contrary, areas such as ‘publishing’ and ‘research ethics’ are usually not a specific added value of the MSCA programme. This suggests that, even if such exclusive tailored training is only reported by a minority of organisations, MSCA fellowships have a specific added value on training provided, widening their focus to topics less familiar to the academic environment.

6.2 Are research collaborations long lasting?

6.2.1 Sustainability of research collaborations supported by MSCA

As outlined above in section 4.2, MSCA had a substantial impact on international collaboration and partnerships. Research collaborations supported by MSCA are to a large extent sustainable. 94% of COFUND respondents, 83% of ITN respondents, 81% RISE and 80% of IF respondents state that they have either fully developed further collaboration or that further collaboration is currently being developed with partners from completed MSCA projects.

Survey responses suggest that around half of project partners on average were new, suggesting that the programme established around one new partnership on average per project.²³⁶

6.2.2 Research capacity and additional funding

MSCA is expected to provide an important contribution on organisations' research capacity. A principal component analysis²³⁷ identifies two main components of MSCA effects on organisational research capacity. The first component includes benefits related to i) strengthening international collaborations; ii) internationalisation of the organisations and its iii) global reputation, and iv) improving capacity to bid for other research funds. The second component includes: i) Providing access to new tools, research facilities or equipment; ii) strengthen national collaborations; iii) increase access to business know how and iv) working with different scientific disciplines, and v) gain control over research agenda.

As a result of a multilevel regression analysis, benefits relating to the first component were found to be more frequently reported in the economics and chemistry panel, suggesting that the programme provides particular added value in these panels with regards to internationalisation, improving organisational reputation and winning follow on funding.

Looking only at projects that were not a continuation of previous research, around 51% of respondents stated that MSCA helped obtaining extra resources. 42% stated that MSCA did not help in winning further research funding, whilst 9% were unsure (see Table 54). In particular, MSCA seems to have helped unlocking resources from national programmes (about 30%) and Horizon 2020 (19%). Notably, 5% of all respondents and 10% of IF beneficiaries who responded to the survey indicated that MSCA helped to win ERC funding (see detailed discussion in sections 4 and 5 above).

Table 54. Has participation in MSCA helped you to acquire additional research funds (choose all that apply)?

If the MSCA funded research was not a continuation of previous research projects, has participation in MSCA helped you to acquire additional research funds? (multiple answers possible)	COFUND	IF	ITN	RISE/IAPP/IRSES	Total
No, participation in MSCA has not had any effect on obtaining additional research funds	19%	33%	49%	50%	42%
Yes, funding from a national programme	38%	35%	23%	29%	30%
Yes, Horizon 2020 funding	19%	18%	18%	20%	19%
Yes, FP7 funding	14%	9%	8%	10%	9%

²³⁶ Data based on 1 396 survey responses (matched with 1 244 projects). This is a weighted average to take into account overrepresentation of ITN projects in the online survey.

²³⁷ Responses were previously converted into a scale: not at all (0), small extent (0.25), moderate (0.50), large (0.75), very large extent (1)

If the MSCA funded research was not a continuation of previous research projects, has participation in MSCA helped you to acquire additional research funds? (multiple answers possible)	COFUND	IF	ITN	RISE/IAPP/IRSES	Total
Don't know	5%	5%	8%	15%	9%
Yes, funding from the private sector	5%	7%	8%	8%	8%
Yes, funding from other programmes and/or initiatives (e.g. fellowships provided by charities, philanthropic organisations or industry)	5%	8%	3%	7%	6%
Yes, funding from the European Research Council	0%	10%	1%	4%	5%
Yes, funding from a regional programme	5%	5%	4%	5%	5%
Yes, European Structural and Investment Funds	10%	1%	1%	2%	2%

Source: Survey of IF, ITN, COFUND organisations – Q42 Has participation in MSCA helped you to acquire additional research funds (choose all that apply)? There were a total of 2 125 responses to this question. Respondents indicated that their project was a continuation of previous research grants, as well as respondents indicating "too early to tell" were excluded, leaving 829 respondents for analysis.

7 Conclusions and recommendations

This section discusses study conclusions and recommendations, based on the evidence presented in previous sections of the evaluation report.

Whilst the approach chosen was robust and introduced new elements compared to previous evaluations, limitations to the data available were also evident. In particular, improving availability and quality of data on individual level participants (i.e. fellows) as well as applicants would help to add value in future evaluations of the programme.

→Recommendation 1: The European Commission should aim to improve availability and quality of data on fellows, in particular collecting more meaningful information on fellow mobility, possibly through the new European initiative to track graduates, and improving data quality/availability on researchers who applied for MSCA fellowships but were not funded.

7.1 Relevance

MSCA is a highly relevant programme: the objectives of MSCA –to invest in people to produce internationally leading (excellent) research and innovation- remain central in the current context. They are expected to contribute to the achievement of growth and competitiveness, and to the solution of complex problems. As the European Commission recently noted: “highly-trained researchers are necessary to advance science and business competitiveness, which, in turn, are important factors in attracting and sustaining investment in Europe”²³⁸.

One example of the relationship between MSCA and excellent research is that three of the 2014 Nobel Prize winners had been actively involved in projects funded by the programme. This is an indication of the relevance of the MSCA design in relation to the achievement of objectives set for it.

The bottom-up approach of the programme provides the space for researchers to come up with their own solutions to major societal and research challenges, and stakeholders agreed that this bottom-up approach should continue.

Equality and diversity are important elements in the programme. To date, 40% of MSCA-supported researchers are women (37% in FP7) – this is higher than the average percentage of female researchers in Europe. Around 41% of MSCA grants funded in Horizon 2020 until January 2017 take into account the gender dimension, higher than the 25% of all grants funded in that period across Horizon 2020. The proportion of women participating in each individual MSCA scheme has generally increased between FP7 and Horizon 2020. MSCA grants under Horizon 2020 so far have also seen a larger share of female coordinators (47%), when compared to the Framework Programme (33%). However, there is a smaller representation of women as supervisors in Individual Fellowships (21%), which reflects the glass ceiling apparent among academic staff and research boards.

→Recommendation 2: While the programme performs well in relation to gender equality, it is recommended that the Career Re-start Panel be enhanced – for example in terms of its duration – to further stimulate this aspect. It is also recommended that additional support be provided to people with disabilities, in order to facilitate their participation in the programme.

The programme does not currently include an objective related to widening participation. EU-13 countries tend to submit fewer proposals than EU-15 countries

²³⁸ European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. p.133. 29-05-2017.

and the quality of EU-13 countries' proposals is, on average, also lower than those of EU-15 countries. In 2016 the Council invited "the Commission and Member States to foster and adequately reward all types of mobility, including virtual mobility, while taking into account the need to close the research and innovation divide across Member States and regions"²³⁹. The Commission is already actively working towards closing the research and innovation divide. In its recent Communication on a renewed EU Agenda for higher education the Commission included a commitment to "Develop opportunities within the Marie Skłodowska-Curie actions that help close the research and innovation divide between Member States and regions and help address brain drain from less developed regions"²⁴⁰.

→Recommendation 3: In this context, and given that the programme aims to support excellence and competitiveness across Europe the inclusion of an objective and associated actions in MSCA to address this divide deserves consideration.

The four specific objectives of MSCA are highly relevant, as they are focused on the development of excellent researchers (and in particular the next generation of researchers), mobility and cross-fertilisation across sectors in order to make Europe's science system more attractive and further extend its contribution to innovation and growth. More specifically, the following aspects can be noted:

SO.1 Fostering new skills by means of excellent initial training of researchers

MSCA has a key role in "building competence in the long term, focusing strongly on the next generation of science, systems and researchers, and providing support for emerging talent"²⁴¹ to consolidate the ERA and make the Union's science system more competitive and attractive globally. The stimulation of excellent and innovative research training and mobility opportunities (geographical, sectoral, disciplinary –see below for further details) are tools that the MSCA uses to better prepare researchers to address current and future challenges. The majority of current EU doctoral candidates will not take up an academic career, and the need to develop the skills that they require to be employed in non-academic sectors has become a major concern. There is a need to broaden their skill base and provide them with interdisciplinary and transferable skills. MSCA aims to achieve this objective primarily through its ITNs and the doctoral programmes in COFUND –see also conclusions on Effectiveness below.

The need to make Europe's science system more competitive remains. For example, the US has a larger proportion of high-impact publications than the EU –while producing fewer scientific publications. This suggests that the US is more efficient at producing the very best scientific outputs. Emerging countries, such as China, are increasingly producing cutting-edge research. This underlines the importance of actions, such as MSCA, to further develop the skills and training of current and future generations of European researchers.

→Recommendation 4: MSCA should continue to place strong emphasis on the development of skills of researchers, in particular of the next generation of researchers. This training should continue to be tailored to the diversity of career pathways that doctoral candidates are likely to pursue.

²³⁹ Council of the European Union (2016) Measures to support early stage researchers, raise the attractiveness of scientific careers and foster investment in human potential in research and development. 14301/16. Brussels, 18 November 2016. P.6.

²⁴⁰ European Commission (2017) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a renewed EU agenda for higher education. SWD (2017) 164 final. p.9.

²⁴¹ Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020.

SO.2 Nurturing excellence by means of cross-border and cross-sector mobility

MSCA stimulates geographical, interdisciplinary and cross-sectoral mobility. The relevance of these different types of mobility for participants varied significantly. Geographical mobility was a strong driver for participation. Its importance was only slightly lower than the importance of skills development. This is aligned with the significant benefits of geographical mobility reported in this evaluation. In Europe, researchers with international experience tend to exhibit a higher scientific impact. Mobility is also a key tool to develop international cooperation, which strengthens the EU's research excellence and attractiveness by providing access to new resources, and can provide access to research test beds and advancements in innovation in areas where European countries are less specialised. This suggests that actions to stimulate mobility continue to be needed.

Almost 140 nationalities have received MSCA funding since 2014. Around one in four MSCA fellows are researchers attracted to Europe from countries outside the EU Member States or the Horizon 2020 Associated Countries. There are imbalances in the mobility of European researchers, with low levels of mobility towards emerging countries such as Brazil, China and India. However, MSCA does seem to be attractive for non-EU researchers and organisations from outside the EU: participations in MSCA account for around 80% of all US participations across Horizon 2020 while for the other top four countries in terms of participation (China, Australia, Canada and Brazil) the share is so far around 50% or higher.

→Recommendation 5: MSCA is a relevant instrument to stimulate mobility to emerging countries. Given the strategic importance of these countries, this could be enhanced further. In this respect, it is recommended that the European Commission considers ways in which Global Fellowships could make mobility towards emerging destinations more attractive, without compromising the programme's emphasis on excellence. This could entail, for example, providing additional information about leading centres in those countries to potential MSCA applicants or other forms of awareness raising. Participation of emerging destinations in RISE and ITN projects could also be further promoted, as this would enable European-based research staff, including PhD candidates, to spend short periods of up to one year in these countries.

MSCA's emphasis on cross-sectoral collaboration, for example through Industrial Doctorates, continues to be relevant and welcomed by stakeholders. Over the course of H2020, it is expected that 65 000 researchers experience international mobility funded by MSCA, and that "for just under half of them, this will also include mobility or exposure to the non-academic sector or vice-versa"²⁴². In 2016, a new pilot, the Society and Enterprise Panel for experienced researchers within the IF was launched. This reflects efforts to better meet the needs of the non-academic sector.

A recent Commission communication campaign addressed specifically at businesses has been associated with an increase in the number of applications from businesses in H2020, although "a number of businesses still lack information about certain specific aspects of the MSCA", including its relevance and potential benefits to them²⁴³.

→Recommendation 6: It is recommended that the Commission continues its efforts to promote MSCA to the private sector, in line with the recommendations from the recent study of business participation and entrepreneurship in MSCA.

²⁴² European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.176.

²⁴³ PPMI, AIT and Optimity (2017) Study of business participation and entrepreneurship in MSCA actions (FP7 and Horizon 2020). Final report to DG Education, Youth, Sports and Culture. P.120.

Interdisciplinary research is gaining relevance because complex societal challenges increasingly require collaboration between different disciplines for their solution. At the individual level, interdisciplinary knowledge is seen to enhance employability. The proportion of all researchers in the EU working in the private sector (48% in 2014) is significantly below the levels of US, Japan, Korea, Canada or China. Collaboration between sectors in terms of public-private co-publications is also comparatively low in Europe. The main barriers to cross-sectoral mobility include researchers' lack of the particular skills to cooperate with industry (see also SO.1).

Around 30% of MSCA-IF proposals are deemed to have included interdisciplinary research. This is a strong signal of the importance of interdisciplinarity within MSCA. The importance of interdisciplinarity does not feature as explicitly in the MSCA objectives as geographical and cross-sectoral mobility, although this does not proscribe the adoption of actions to the work programme in order to enhance interdisciplinarity.

➔Recommendation 7: It is recommended that ways to further enhance interdisciplinary work within the MSCA are promoted. This may include increased flexibility of calls and researcher positions, such as combined positions, or part-time work – not to limit the possibilities of entrepreneurial activity or formal training to enhance interdisciplinary knowledge – and secondments. Actions could also be adopted so that interdisciplinary researchers are assessed according to their profile: for example, recognising that interdisciplinary researchers may have profiles that differ from the standard track record of other excellent researchers.²⁴⁴

SO.3 Stimulating innovation by means of cross-fertilisation of knowledge

Europe lags behind main international competitors such as the US, Canada and Australia in terms of innovation. MSCA's emphasis on cross-fertilisation and sharing of knowledge from research to market (and vice-versa) is pursued through the mobility of highly skilled research and innovation staff. Commercial and innovation outcomes were given a more prominent role in H2020 compared to FP7, to more decisively address this objective.

Participants in the programme (in particular ERs), however, ranked cross-sectoral mobility as less relevant to them than geographic or interdisciplinary mobility. Sectoral mobility is particularly relevant to early career researchers/ ITNs. This is logical since ESR may be considering careers in academia and industry, whereas most ER will be established academics. This further underlines the importance of skills training at this level (SO1).

RISE provides a critical mass, with almost 23 000 planned secondments with staff exchanges to or from non-academia and to or from third countries in the first three years of H2020. A number of stakeholders (policy-makers) view the RISE action as being related primarily to the building of long-term relationships, rather than excellent science.

SO.4 Increasing structural impact by co-funding activities

There is a clear rationale for the establishment of mechanisms that enable European stakeholders to pool resources and combat fragmentation in terms of objectives and actions. There is also a clear rationale to spread the best practices generated by MSCA as aimed by the MSCA COFUND scheme. COFUND aims to achieve a "structural impact" as the leverage of additional resources leads to increases in the number of available mobility opportunities (geographical, sectoral, interdisciplinary) across

²⁴⁴ See also European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.148.

Europe. COFUND also aims to help to reshape existing mobility schemes and spread the adoption of innovative training and the improvement of employment conditions for researchers, which as discussed previously, are highly relevant in the current context.

Raising awareness of research careers

MSCA aims to raise awareness of researchers' work amongst the general public (in particular young people), and help change public perception of science, in order to enhance the recognition of research and innovation activities and the attractiveness of research careers. While all MSCA projects include dissemination activities, the European Researchers' Night through its funded projects around Europe and beyond specifically addresses these aims of the programme. The majority of European countries have a lower share of doctorate holders (compared to their population) than international competitors such as the US, Australia or Canada, and there is a significant lack of awareness and understanding of researchers' work and its importance for the EU.

7.2 Efficiency

The implementation of the programme is appropriate and efficient.

There is consensus among stakeholders that the budget is insufficient, reflected by high oversubscription leading to low success rates, particularly affecting ITNs. Indeed, the programme's oversubscription rate has doubled between FP7 and Horizon 2020. This continued oversubscription reduces the overall programme impact, and provides clear indication that the programme impact could be larger if more EU budget were to be made available. The oversubscription rate is highest for ITN, with ten times more high quality proposals not funded compared to proposals funded, under H2020. IF received around five times as many high quality proposals than it could fund, and RISE around two times as many. The insufficient programme budget could result in a loss of talent with wider implications on research and innovation capacity across the EU.

➔Recommendation 8: It is recommended that the European Commission considers increasing the programme budget in order to reduce current oversubscription rates (ITN are in particular need of a budget increase).²⁴⁵

A further option to reduce oversubscription, at least for single beneficiary actions, would be to limit the ability for resubmission similar to restrictions imposed by the European Research Council. For instance, coordinators of proposals below a certain threshold (but above the quality threshold) could be asked to resubmit but with a delay of one year. There are however numerous issues that would need to be examined with respect to the practical aspects of such restrictions, e.g. would the individual researcher funded and/or the coordinator be prevented from re-applying?

➔Recommendation 9: It is recommended that the European Commission studies the implications of adding resubmission restrictions

The administrative budget committed by REA to MSCA in H2020 constitutes only a small proportion of the operational MSCA budget, averaging 2.5% between 2009 and 2015, and therefore consistently below the legal objective of maximum 5%. In addition, the proportion of the MSCA budget devoted to management is also consistently lower than the maximum 5%. The use of unit costs in MSCA means that the programme has a very low risk of errors in financial management, contributing further to the efficiency of programme management.

²⁴⁵ Alleviating the oversubscription of ITN would be most costly, but given the strong EU added value of the ITN such change would have the largest potential for delivering additional programme results.

→Recommendation 10: While the relative management costs of MSCA remained consistently below the legal maximum of 5% between 2013 and 2016, it is recommended that the European Commission continues to efficiently monitor these costs.

REA's operational commitment and payment appropriations for the (non-differentiated) administrative appropriations were almost completely fulfilled between 2011-15. The evaluation process is well designed and managed.

With respect to the effectiveness and appropriateness of administrative and financial rules, the majority of funded organisations indicated satisfaction with different aspects of the administrative and financial programme implementation

The average time-to-grant for MSCA projects decreased significantly between 2009 and 2015.

The largest, proportionate reduction of average time-to-grant was with respect to ITN grants (39% fall from 2009 to 2015), followed by IRSES (33% reduction). European Researchers' Nights and Reintegration grants were the only actions under the FP7 People Programme that had a lower average time-to-grant compared to the overall FP7 average. In Horizon 2020, the average time-to-grant of MSCA was so far in line or slightly below average time-to-grant for the overall Framework Programme.²⁴⁶

Monitoring indicators are fit for purpose. REA's overall processing and completion of payments also improved between 2012 and 2015.

Furthermore, survey respondents were generally satisfied with the level of funding received. In line with the interim review of MSCA unit costs conducted by ICF, there is strong evidence that the programme offers adequate and attractive levels of funding.

As regards the programme's cost-effectiveness, the following key messages are emerging from the analysis.

- At the programme level, the review of programme administrative costs and a comparison against other Horizon 2020 programmes managed by REA suggests that the MSCA programme is cost-effective.
- At the project level, the proportionately small share MSCA unit cost system dedicates to management and indirect costs suggests MSCA is cost-effective.
- Another indicator of MSCA mechanisms efficiency was the almost ubiquitous view of surveyed MSCA fellows (regardless of action) who believed their institution spent the MSCA funds directly improving research, training and networking to support the quality of research and training.

There are no indications that other instruments or funding mechanisms could achieve a higher level of cost-effectiveness. Host institutions provide excellent research conditions and in some cases, complement MSCA funding with other sources of funding.

The European Researchers' Night, with an annual budget of EUR 4 million, can be considered cost-effective as it manages to reach out to more than one million citizens every year, right across the EU, in particular

informing young people about a possible career in research.

²⁴⁶ In 2015, average time-to-grant of MSCA was 189 days, compared to 203 on average overall.

7.3 Effectiveness

Drawing on analysis and data over several years²⁴⁷, a large body of evidence shows that MSCA continue to have a positive impact on individual researchers, organisations, and at the system level. It should be noted however that no MSCA projects under Horizon 2020 had been completed at the time of writing. It is thus clear that the measurable output at this stage of the Horizon 2020 programme implementation is somewhat limited. Moreover, as the full value and impact of mobility and opportunities opened up by MSCA is often revealed after many years, the results of some FP7 projects have been used where appropriate.

7.3.1 Individual level

7.3.1.1 Training and skills development

MSCA's training and professional development dimension is strong: Over three quarters of participants are (very) satisfied with the training and professional development opportunities they received during their MSCA fellowship.

The training followed by fellows is effective in equipping them with important skills. The skills which have been acquired most often to a (very) large extent according to fellows include both skills specific to the research profession, such as interdisciplinary techniques, skills associated with getting published, the use of specialised equipment or research data management, and transferable skills, such as presentation skills, languages and project management skills. About half of fellows report to have acquired these skills to a (very) large extent during the fellowship.

ITN stands out in terms of the volume of training followed by fellows (30% of ITN fellows who responded to the survey had followed more than 20 days of training per year) and fellows' satisfaction with the training areas covered (66% of ITN survey respondents were (very) satisfied), indicating that the strong intended focus of ITN on intensive initial training for Early Stage Researchers (ESR) is indeed put into practice.

Almost 60% of MSCA fellows who responded to the survey indicated that there were areas in which they would have liked more training such as report and proposal writing, training in new and/or advanced scientific methods, project management and team management and leadership skills.

→Recommendation 11: It is recommended that the European Commission continues to stimulate the availability of relevant training as part of the programme. This could include the development of online-training modules to enhance equal access of MSCA fellows to high quality training opportunities in areas of specific relevance to the MSCA programme (e.g. setting up modules in interdisciplinary research, entrepreneurship, open science). At the same time, it is important to ensure the right balance between the training and secondments as part of ITN projects with the need to produce high quality research and complete the thesis in the timeframe foreseen.

7.3.1.2 International mobility and collaboration

MSCA fellows are much more internationally mobile than other researchers throughout their careers, in particular IF fellows. Evaluation findings suggest that over the past 10 years, one third of IF fellows have changed their country of employment at least twice, compared to 1 out of 10 researchers in the comparison group. More than half of the publications of IF fellows between 2007 and 2016 were publications involving international collaboration. This was 15 percentage points above the comparison group of researchers similar to IF.

²⁴⁷ This includes projects financed under FP7 and H2020. It also draws largely on surveys of MSCA fellows and organisations carried out for this evaluation in 2016.

Some 80% of fellows created collaborations with researchers abroad (i.e. in countries other than the country of the fellowship) during MSCA fellowships, and these collaborations tend to be sustained. Most often fellows collaborate with researchers from (other) academic organisations.

Data show that MSCA is open to the world with around one in four MSCA fellows attracted to Europe from countries outside the EU Member States or the Horizon 2020 Associated Countries. In terms of international third-country participation, MSCA plays a strong role in ensuring the international orientation of Horizon 2020. So far, MSCA accounts for around 50% of all third country participation in Horizon 2020. Moreover, RISE is the most international scheme across Horizon 2020, with around 32% of its total participations coming from third countries. IF(11%) and COFUND (7%) also exhibit international participation levels above the Horizon 2020 average.

7.3.1.3 Cross-sectoral mobility and collaboration

MSCA contributes to cross-sectoral mobility of researchers during and after the MSCA projects. Over the first three years of RISE 2014-16, there were 6 510 planned secondments from academia to non-academia and 4 302 from non-academia to academia. Moreover, around 12 000 of the approximately 27 000 fellows that have been funded under the budget of the MSCA calls for the years 2014-16 are estimated to experience some form of cross-sectoral mobility out of or into an academic setting.

In addition, the survey of MSCA fellows shows that 11% of MSCA fellows mainly hosted in the academic sector during their fellowship moved to the non-academic sector after the end of the fellowship (RISE/IAPP: after terminating employment with the sending organisation). 38% of these attribute this move to a (very) large extent to MSCA participation. Cross-sectoral mobility after the end of the fellowship is particularly high under ITN (19% of fellows moved to the non-academic sector) and RISE (28% of those who leave their sending organisations move to the non-academic sector). With regard to cross-sectoral collaboration in research, ITN fellows perform strongly: their share of academic-corporate cross-sector publications (4.3%) is significantly higher than the world average (2.6%) and also higher than the cross-sector publication shares of the comparison group of researchers similar to ITN (3.8%).

7.3.1.4 Interdisciplinary mobility

The MSCA programme is effective in stimulating cross-fertilisation of knowledge across fields: one in four MSCA fellows moves to a new field of research as part of their first employment after their fellowship, and more than half of them believe that this is to a (very) great extent the result of participating in MSCA. The share of fellows who move to a new field of research after the end of their fellowship is particularly high in ITN (27%) and RISE (39% of those changing employers).

7.3.1.5 Employment/ careers/ excellence

There is strong evidence that the MSCA programme is effective in boosting the career of researchers. Around 60% of past MSCA fellows believe that it would have taken them more time to attain their subsequent career stage without the MSCA fellowship, and 12% believed they would not have attained the subsequent career stage at all. 16% of fellows believed that they would have attained the subsequent career stage in a similar timeframe and only 2% of respondents believe they would have attained a subsequent career stage faster.

Of the 21% of MSCA fellows who moved to a permanent position after their MSCA fellowship, more than half (56%) report that this was to a (very) large extent the result of MSCA support;

38% of respondents moved to a more senior position after their MSCA fellowship. Two thirds of these fellows attribute this career progression to a (very) great extent to participation in MSCA.

There is also compelling evidence that MSCA helps produce the next generation of leading researchers: overall, MSCA fellows are twice as likely as the average researcher to have publications that belong to the Top 1%, Top 5% and Top 10% of cited publications. IF fellows perform up to three times better than the average researcher with regard to Top 1% cited publications and out-performed the comparison group of successful, established, high profile researchers constructed for this evaluation on important indicators of excellence (i.e. Top 5% and Top 10% cited publication share of total output).

Among former IF fellows, 95% reported that they were in employment at the time of the survey (end 2016).

The evidence shows MSCA had helped create new jobs in addition to staff directly funded by the project. In total, 23% of organisations had created (or will create) one additional full time equivalent job while 12% of organisations had created two or more FTE posts as a result of participation in MSCA.

7.3.2 Organisational level

At organisational level, MSCA has a larger impact on the quality of training than on the breadth of training offered. The quality of the training available to researchers in the organisation is often enhanced by the knowledge and skills brought to the organisation by the fellows, in particular for IF. ITN organisations are successful in providing fellows with exposure to industry (52% of ITN fellows versus 29% of comparison group researchers).

Evidence shows that organisations participating in MSCA are more often complying with the Charter and Code with regard to the openness and transparency of recruitment procedures. Around 55% of MSCA fellows perceive the recruitment procedures at the institution where they did their fellowship to be open and transparent to a (very) great extent, compared to 43% of researchers in the comparison group.

Organisations participating in the ITNs tend to implement the Principles of Innovative Doctoral Training. 72% of ITN fellows rate the quality of supervision they receive/have received as (very) good (15% report it to be fair). A similar percentage is (very) satisfied with the quality, amount and coverage of training received, more so than researchers in the comparison group. ITN fellows also tend to have more exposure to industry work places during their doctoral studies than researchers in the comparison group.

New collaborations resulting from MSCA projects are more often international than national (84% versus 45% for new collaborations with (other) academic organisations, and 53% versus 30% for (other) non-academic organisations).

New collaborations resulting from MSCA projects are also more often with (other) academic organisations than with (other) non-academic organisations (45% versus 30% for national collaboration, and 84% versus 53% for international collaboration).

With regard to organisations' research capacity, MSCA's impact is greatest on the internationalisation and interdisciplinarity of organisations, and their capacity to bid for other research funds.

Organisations are highly effective in delivering the publications (90% of the organisations in the evaluation survey reported to have achieved their publication objectives) and prototype development and demonstrations and new improved

technical codes and standards (80% of organisations) proposed as part of their MSCA project application. The share of organisations that achieved patent/trademark applications, new or improved products, services or clinical trials as initially planned is lower (45%, 47% and 57% respectively).

→Recommendation 12: The European Commission should investigate in more detail why only about half of organisations which planned patent/trademark applications, new or improved products, services or clinical trials reported to have achieved these plans, i.e. whether this is due to a time lag between the end of the MSCA project and achieving this output, whether project proposals were too ambitious or whether this is due to the risk of failure implied in research.

Few organisations report commercial benefits as a result of their MSCA project (6%). Most of these benefits come from the use of project results within the organisation.

For ITN, the case studies and comments provided by organisations through the survey show that project partners have different needs and that satisfaction with the project depends on the extent to which the consortium finds a fair compromise to accommodate these during implementation. This includes various elements of the project, from the length of secondments to the formula used for sharing the institutional unit costs.

7.3.3 System level

Around 45% of ITN fellows (40% of MSCA fellows overall) reported that they were not very likely to have pursued a research career in the absence of MSCA funding. There is thus a role for MSCA as a contributing factor in the attraction into / retention in research careers of a substantial proportion of participants. Moreover, more than one quarter of organisations report that the MSCA programme has helped them to retain excellent researchers who would have left Europe otherwise.

COFUND has a substantial effect on opportunities for researchers for cross-border mobility in a country, both through the creation of new programmes and the opening of existing programmes for transnational mobility. One third of COFUND organisations which responded to the survey report that participation in COFUND has increased the number of transnational fellowships to a (very) large extent. Fewer organisations report that participation in COFUND has increased the number of intersectoral or interdisciplinary fellowships to a (very) large extent (6%). A tangible structural impact of COFUND with regard to increasing the number of international, interdisciplinary and cross-sectoral fellowships can be expected in countries with several parallel-running COFUND projects. A structural impact on working conditions of fellows has been reported when national schemes are adjusted to fit the COFUND requirements in view of applying for COFUND.

The creation of a genuine open labour market for researchers is one of the priorities of the European Research Area (ERA). In this regard, the MSCA continue to have a pronounced structuring impact on ERA and institutional practices by contributing to the systematic implementation of the European Charter and Code of Conduct for the Recruitment of Researchers and in particular by setting standards for quality (doctoral) training, attractive employment conditions and open recruitment for all EU researchers. For example, all funded MSCA participants are required to apply the principles of the European Charter for Researchers and Code of Conduct, and this evaluation shows that indeed the majority of MSCA fellows (55%) perceive the recruitment procedures at the institution where they did their fellowship to be open and transparent to a (very) great extent.

MSCA is also contributing to the ERA by creating collaboration among academic organisations, and between academic and non-academic organisations, which this study shows are highly sustainable.

Furthermore, in particular, ITNs contribute to the wide promotion and implementation of the Principles for Innovative Doctoral Training which identify the need to provide young researchers with quality supervision, (transferable) skills training, sustainable professional networks, and exposure to industry and other employment sectors. Compliance with the IDT of organisations participating in ITN is confirmed by ITN fellows consulted as part of this evaluation study. Moreover, evidence from interviews suggest that in some countries ITNs have had an impact on national doctoral programmes as they set best practice examples which are followed by other organisations, also those not receiving EU funding.

There is a broad consensus among participating organisations that the European Researchers' Night projects contribute to establishing direct contacts between researchers and the public at large and that it increased the visibility and understanding of researchers' work.

European Researchers' Night projects attract more than one million citizens across Europe and have enabled the participating organisations to better involve various groups of stakeholders compared to previous or other events, in particular the young.

In terms of international third-country participation, MSCA plays a strong role in ensuring the international orientation of Horizon 2020. So far, MSCA accounts for around 50% of all Third Country participation in Horizon 2020.

7.3.4 Cross-cutting issues

MSCA performs well in relation to cross-cutting objectives such as gender balance, societal challenges, Responsible Research and Innovation (RRI) and open access.

The general openness of and bottom-up approach taken by MSCA has allowed a large majority of institutions to train and upgrade the skills of a new generation of researchers able to tackle a broad range of current or expected societal challenges. Moreover, MSCA funding addresses societal challenges to a significant extent, above the Horizon 2020 average and well ahead of the other areas in the excellence pillar.

MSCA has performed strongly in relation to gender equality, as discussed above. MSCA performs in line with Horizon 2020 in relation to other cross-cutting issues, such as Responsible Research and Innovation (RRI) or open access. It is worth noting that ITN fellows had a significantly higher share of their articles published in 'gold' open access compared to their comparison group (42% compared to 33% between 2006 and 2016). This suggests that the programme is nurturing new cultures of publishing in the next generation of Europe's leading scientists.

There are wide discrepancies between Member States in their ability to attract funding, with EU-15 countries out-performing EU-13 countries, and the group of Widening Countries generally lagging behind. Other data show that in general EU-13 countries tend to submit fewer proposals than EU-15 countries and that the quality of submitted proposals is also lower.

There is a broad consensus among participating organisations that the European Researchers' Night projects contribute to establishing direct contacts between researchers and the public at large and that it increased the visibility and understanding of researchers' work.

European Researchers' Night projects attract more than one million citizens across Europe and have enabled the participating organisations to better involve various groups of stakeholders compared to previous or other events, in particular the young.

7.4 Coherence

MSCA is coherent with other H2020 actions. MSCA is particularly supportive of the international participation objectives of H2020. MSCA has helped beneficiaries to acquire additional FP7 and H2020 funds post-participation. This is suggestive of the complementarity between these policy instruments. The reduction of actions under H2020 has contributed to the clarity and coherence of its integrating parts. Some stakeholders reported a degree of overlap with the Horizon 2020 SME Innovation Associate Initiative (IAI) that funds the recruitment of doctorate holders in SMEs.

→Recommendation 13: Given the commonalities between both initiatives it is recommended that the Commission ensures coherence and complementarity between the actions, and considers the possible incorporation of IAI into MSCA.

The programme includes a coherent set of actions. A small number of stakeholders questioned the coherence of NIGHT with other actions. NIGHT was seen as less directly linked with the core concern of the programme around excellence than other actions. NIGHT aims to raise awareness and recognition of the public on research and innovation activities and research careers. Its coherence and synergies with other parts of the programme could be enhanced by modifying NIGHT's narrative in order to present NIGHT as a platform that aims to "showcase" excellent research to the general public.

→Recommendation 14: In order to enhance the coherence of the European Researchers' Night with other actions, NIGHT's narrative and activities could be modified to more clearly emphasise its role in showcasing excellent research – in particular, excellent research associated with MSCA – and connect it more strongly to other parts of MSCA. This showcasing of excellent research could include an explicit European dimension, for example by linking MSCA projects (including completed projects) on selected topics through ICT. It is also recommended that the EU continue to exchange good practice among the national coordinators of the NIGHT.

MSCA exhibits a high degree of coherence with other EU policy initiatives including Europe2020, its flagship initiatives, the New Skills Agenda for Europe and the European Research Area (ERA). It is also coherent with ET2020 and recent legislative developments on the conditions of entry and residence in the EU for the purposes of research.

MSCA is highly coherent with EU financial instruments such as Erasmus+, the European Structural and Investment Funds (ESIF). This coherence is manifested in the mutually reinforcing character of these interventions and MSCA –see also section on EU added value.

→Recommendation 15: Given the large degree of coherence with related EU policy initiatives, it would be appropriate to maintain the mobility, training and career development of researchers through MSCA within H2020 and future Framework Programmes for research.

→Recommendation 16: Synergies with the European Structural and Investment Funds (ESIF) through the COFUND action have materialised during the implementation of MSCA. Best practices in the use of such synergies, and more formal mechanisms to develop them, should be identified and promoted to increase their uptake.²⁴⁸

MSCA is complementary to the objectives of regional and national funding for the development of research excellence. National funding for doctoral programmes normally does not normally include mobility requirements. Those national funding

²⁴⁸ MSCA Advisory Group Report June 2016

schemes that include mobility requirements tend to have a lower degree of flexibility than MSCA with regard to the geographical scope of the hosting institution, and tend to support either young researchers or senior researchers, but rarely both types. Most often, they aim to attract highly experienced researchers. This contrasts with MSCA's emphasis on skills development. MSCA, additionally, offers a greater emphasis on inter-sectoral research than most national programmes. The complementarity between MSCA and national funds can be seen in that a high proportion of MSCA beneficiaries reported that MSCA had helped them to acquire non-MSCA related national and/ or regional research funds. 30% of COFUND survey respondents and 20% of IF survey respondents reported that their MSCA participation had helped them to acquire non-MSCA related national funds.

Complementarity with national funding programmes has been enhanced through the introduction, in 2016, of a Seal of Excellence, which is awarded to IF proposals which score 85% or above but for which there is insufficient funding through the MSCA budget. The Seal of Excellence provides researchers who have achieved this score with recognition for the quality of their proposals; it can be used by these researchers and the hosting institutions with whom they applied to seek alternative funding sources – for example at regional and national level, including through the use of ESIF.²⁴⁹

Whilst MSCA in principle offers flexible funding arrangements, there is more that could be done to increase the flexibility of the programme. For example, the exclusivity requirement in RISE (exclusivity of work on the MSCA project during the secondment) means that sometimes long secondments under this action can be considered difficult/impractical by senior staff who would like to undertake them, but are deterred by the programme requirement not to work on other projects during the secondment period.²⁵⁰

The 36 month maximum period for ITN fellows does not match programme structures in some national contexts where doctoral studies are designed as 4-year programmes. In some cases this may deter participation due to difficulties to find funding for the 4th year of study and reduces the incentives of institutions to take part in ITNs. Given current levels of oversubscription in ITNs this does not seem to be a widespread problem, even though it may affect certain centres of excellence in specific locations where a 4th year is required. Funding a 4th year in those cases, however, would concentrate the budget further, reduce the number of projects and increase levels of oversubscription, unless a significant budgetary increase for the action be achieved. It should also be noted that a number of countries with 4 year structures have recently moved or are in discussions to move to a 3 year structure.

²⁴⁹ European Commission (2017) European Commission Staff Working Document: Interim Evaluation of H2020. Annex 2. SWD 221 final. 29-05-2017. P.172.

²⁵⁰ See http://ec.europa.eu/research/participants/portal/doc/call/h2020/msca-rise-2015/1647602-faqs_rise_2015_updated_en.pdf p.8.

7.5 EU added value

Survey responses suggest that in Horizon 2020 so far, high-quality proposals equalling EU funding of around EUR 9.5 billion did not go ahead in the absence of MSCA support.²⁵¹ The evaluation found that only 6% of unsuccessful proposals went ahead without significant changes, suggesting a remarkably low degree of deadweight.

The evaluation found EU added value of the programme across all three levels of intervention. At individual level, MSCA provides particular EU added value through its offer of structured training and career development for researchers during and after their PhD. Furthermore, both individual researchers and institutions build their networks, often facilitating long-term collaboration.

At project level, MSCA's EU added value is particularly strong in providing cross-border and cross sector mobility, which can be seen by the large amount of unsuccessful proposals which have to cut back their international and intersectoral activities in the absence of EU funding.

In addition, the international training and supervision offered within MSCA projects is considered to be of extremely high level and often adds value to training and supervision available under national schemes, according to stakeholders. MSCA is not only contributing to the quality of existing training, but also encourages the development of training tailored to the needs of MSCA fellows that would not be available otherwise.

Training offers that are reserved for MSCA fellows most often concern industry or market-related topics such as 'Marketing and sales' and 'Product development'. On the contrary, areas such as 'publishing' and 'research ethics' are usually not a specific added value of the MSCA programme. This suggests that, even if such exclusive tailored training is only reported by a minority of organisations, MSCA fellowships have a specific added value on training provided, widening their focus to topics less familiar to the academic environment.

Researchers are generally satisfied with the level of training offered, and organisations indicate that the quality of training has increased with participation in MSCA. Despite the high levels of overall satisfaction with the breadth of training offers, almost 60% of MSCA fellows who responded to the survey indicated that there were areas in which they would have liked more training such as proposal writing.

Beneficiary organisations reported a strong effect on winning follow up funding. Looking only at projects that were not a continuation of previous research, around 51% of respondents stated that MSCA helped in obtaining extra resources.

At system level, the programme has provided EU added value through a structuring effect across Europe. MSCA contributes positively to ERA by helping to create a more effective EU research system, boosts transnational cooperation and competition and promotes an open labour market for researchers. More specifically,

- The programme serves as a delivery mechanism for the European Charter and the Code of Conduct for the Recruitment of Researchers, introducing standards and common rules that are increasingly adopted. All funded MSCA participants are required to apply the Charter and Code.

²⁵¹ As of January 2017, high quality proposals worth EUR13 billion were unsuccessful in winning funding under Horizon 2020. Using survey responses from unsuccessful applicants, 73% of unsuccessful proposals seem to not be implemented at all after failing to win EU funding, resulting in a loss of projects worth around EUR9.5 billion so far.

- It spreads good practice in researcher training and skill development at national level and contributes, in particular, to the promotion and implementation of standards for doctoral training through the stimulation of the use of the Principles for Innovative Doctoral Training (IDT). A further structuring effect of the programme is that it helps to introduce industry relevant training to institutional curricula.
- The MSCA bottom up approach has allowed participating organisations to upgrade their training offers and nurture a new generation of researchers.
- The MSCA has fostered international mobility and the formation of knowledge networks and collaboration across Europe.
- Finally, host institutions believe that the programme has helped to retain excellent researchers in Europe who would have otherwise left.

➔Recommendation 17: Recommendation 17: It is recommended that the European Commission considers ways to encourage further added value in the training offered by host institutions beyond the structuring effect observed. Particular attention should be paid to areas where fellows indicated they would have liked more training.

ANNEXES

Annex 1 Programme activities

This Annex presents an overview of programme activities, to complement the summary presented in section 1.

Table 55. Participation patterns by country in FP7 and Horizon 2020

	Country group	Nr of participations	% of all participations	Nr of coordination roles	% of coordination roles	EU funding allocated (EUR million)	% of EU funding allocated	Success rate	% of participations across FP7 / H2020	Success rate across FP7 / H2020
Seventh Framework Programme (FP7)	EU13	1 581	8%	562	5%	190	4%	22%	10%	18%
	EU15	16 211	80%	9,065	81%	4,107	85%	20%	78%	22%
	AC Countries	2 178	11%	1,362	12%	511	11%	23%	8%	22%
	Third Countries ²⁵²	198	1%	138	1%	16	0.3%	n/a	4%	24%
	Grand Total	20 187	100%	11,127	100%	4,824	100%	19%	100%	22%
	Widening Countries	230	12%	1042	9%	307	6%	21%	12%	17%
Horizon 2020	EU13	497	6%	110	3%	97	5%	11%	9%	11%
	EU15	6 843	87%	2,963	91%	1,894	90%	13%	83%	14%
	AC Countries	505	6%	173	5%	123	6%	12%	7%	14%
	Third Countries ²⁵³	7	0.1%	0	0%	1	0.1%	19%	2%	18%
	Grand Total	7 852	100%	3,246	100%	2,115	100%	13%	100%	14%
	Widening Countries	678	9%	117	4%	133	6%	8%	12%	11%

Source: ICF CORDA analysis

²⁵² If partner organisations are included in the data, the share of Third Party participations increased to 11%, compared to 5% for other parts of FP7.

²⁵³ If MSCA partner organisations are included, partner organisations from Third Countries represent 11% of all participations, compared to 4% across Horizon 2020 – the largest share of Third Country participations across all parts of Horizon 2020.

Table 56. Participants and Participations by EU-28 Member State in Horizon 2020
MSCA – Widening countries in bold

Country	Nr. of distinct participants in Signed Grants	Nr. of Projects Coordinators in Signed Grants	Nr. of Newcomers in Signed Grants	Nr. of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
Austria	72	59	15	191	48.7
Belgium	66	97	13	268	87.5
Bulgaria	33	6	8	34	3.2
Croatia	11	2	2	16	2.6
Cyprus	14	16	3	40	8.5
Czech Republic	36	12	5	65	16.7
Denmark	48	143	7	261	86.6
Estonia	14	11	2	28	5.0
Finland	39	38	11	119	34.0
France	220	294	53	721	192.4
Germany	320	278	86	926	263.1
Greece	79	46	25	189	37.3
Hungary	26	9	4	44	8.2
Ireland	47	92	19	167	62.7
Italy	231	216	68	625	150.6
Latvia	4			6	1.3
Lithuania	14	5	2	22	3.2
Luxembourg	10	6	2	19	4.0
Malta	8	3	5	13	1.6
Netherlands	121	234	36	541	178.3
Poland	68	29	16	114	28.8
Portugal	81	49	17	165	37.0

Country	Nr. of distinct participants in Signed Grants	Nr. of Projects Coordinators in Signed Grants	Nr. of Newcomers in Signed Grants	Nr. of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
Romania	34	7	12	41	4.4
Slovakia	24	4	10	32	5.5
Slovenia	23	6	8	42	8.2
Spain	256	302	68	719	182.6
Sweden	64	64	22	240	74.4
United Kingdom	280	1 045	79	1 692	455.1
Total EU-28?	2 243	3 073	598	7 340	1 991.2

Source: DG RTD, January 2017

Table 57. Participants and Participations by Country group in Horizon 2020 MSCA

Simplified Country Group	Nr of distinct participants in Signed Grants	Nr of Projects Coordinators in Signed Grants	Nr of Newcomers in Signed Grants	Nr of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
AC Countries	214	173	81	505	122.6
MS-13	309	110	77	497	97.1
MS-15	1 934	2 963	521	6 843	1 894.1
Third Party Countries	7			7	1.1
Total	2 464	3 246	679	7 852	2 114.9

Source: DG RTD, January 2017

Table 58. Participants and Participations by EU-28 Member State in FP7 MSCA – Widening countries in bold

Country	Nr. of distinct participants in Signed Grants	Nr. of Projects Coordinators in Signed Grants	Nr. of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
Austria	114	44	454	119
Belgium	117	39	634	188
Bulgaria	42	17	102	6
Croatia	26	12	47	9
Cyprus	17	8	76	13
Czech Republic	65	32	196	30
Denmark	70	21	447	155
Estonia	22	10	67	10
Finland	65	24	247	51
France	324	131	1 979	462
Germany	477	164	2 186	570
Greece	77	40	461	89
Hungary	68	32	289	33
Ireland	64	24	373	115
Italy	311	139	1 397	290
Latvia	19	6	88	3
Lithuania	21	7	67	5
Luxembourg	9	4	26	11
Malta	11	4	26	1
Netherlands	152	49	1 163	314
Poland	116	53	366	45
Portugal	99	53	388	61
Romania	48	20	95	9
Slovakia	31	12	70	11

Country	Nr. of distinct participants in Signed Grants	Nr. of Projects Coordinators in Signed Grants	Nr. of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
Slovenia	28	8	92	15
Spain	306	174	1 710	397
Sweden	101	25	610	183
United Kingdom	362	143	4 136	1 101
Total EU-28	3 162	1 295	17 792	4 296

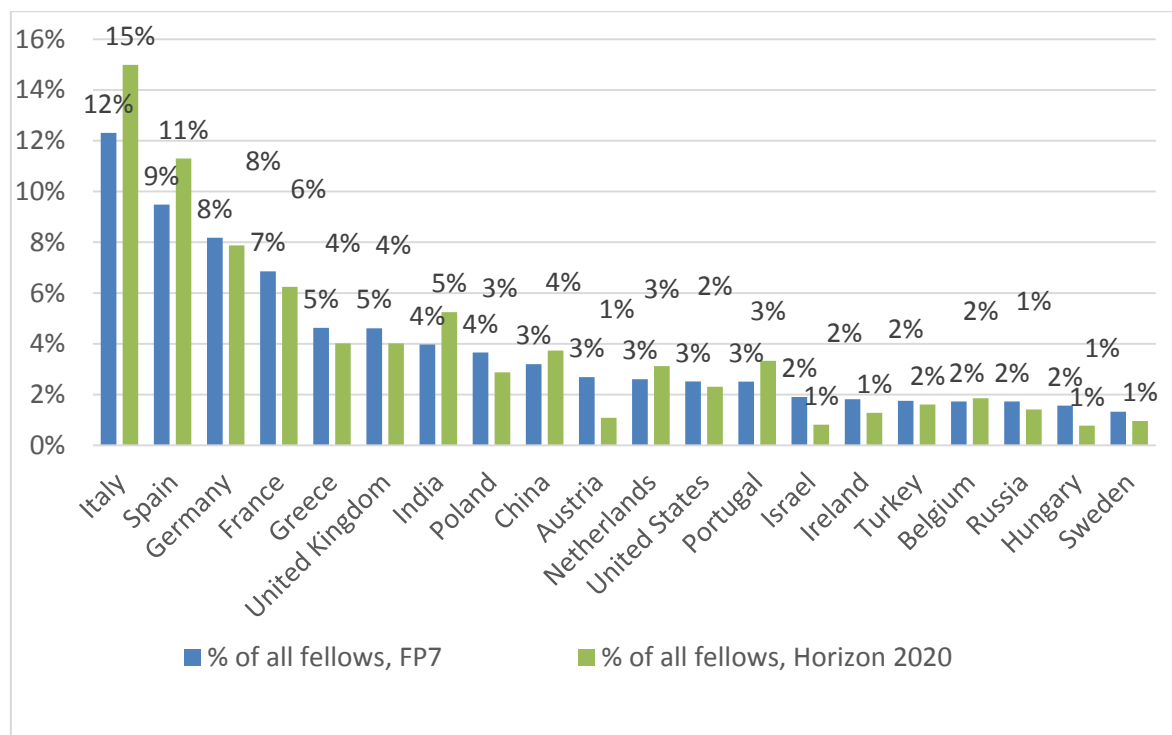
Source: DG RTD, January 2017

Table 59. Participants and Participations by Country group in FP7 MSCA

Country	Nr. of distinct participants in Signed Grants	Nr. of Projects Coordinators in Signed Grants	Nr. of Participations in Signed Grants	EC Contribution to Participation in Signed Grants (EUR million)
AC Countries	371	176	2 178	512
Member States	3 162	1 295	17 792	4 297
Third Party Countries	163	95	198	16
Undefined	17		19	0
Total	3 713	1 566	20 187	4 824

Source: DG RTD, January 2017

Figure 41. Nationality of fellows, FP7 and Horizon 2020, top 20 countries



Source: ICF CORDA analysis, RISE/IRSES/IAPP figures excluded

Annex 2 Evaluation questions

This section presents the evaluation questions from the terms of reference by evaluation criterion and report section.

A3.1 Evaluation questions related to Relevance (section 2)

- To what extent the MSCA objectives correspond to the needs and problems within the EU?
- How relevant are the MSCA to the needs of researchers and innovators?
- How relevant is the bottom up nature of the programme? How relevant is the programme to the needs of the organisations?
- Why is there a continued need to fund MSCA-type of activities through EU funding?

A3.2 Evaluation questions related to Efficiency (section 3)

- To what extent is the implementation and management structure of the MSCA appropriate, efficient, and well-functioning?
- Have the simplification measures in H2020 MSCA been effective (fewer action lines, use of unit costs, streamlined procedures)? Are they recognised and appreciated by participants? To what extent is there a scope for additional simplification and burden reduction?
- Are the monitoring mechanisms applied by the Commission and the REA efficient/ cost effective?
- Do the indicators used correspond well to the monitoring needs?
- Were the costs involved justified given the volume of activity and the changes/effects which have been achieved?
- Are the activities carried out efficient and are they clear and appropriate?
- Could the use of other instruments or mechanisms provide better cost-effectiveness?
- Is the size of budget appropriate and proportionate to what the MSCA intended to achieve? Is it sufficient for reaching a critical mass of impact? Could the same results be achieved with less funding?

A3.3 Evaluation questions related to Effectiveness (section 4)

- To what extent did the MSCA and predecessor enhance the employability of researchers?
- To what extent did the MSCA and predecessor contribute to development of research careers? (independent of employment in industry or academia)
- To what extent did the MSCA and predecessor contribute to researchers' excellence?
- To what extent did the MSCA and predecessor contribute to mobility of researchers and development of international networks? (intersectoral, interdisciplinary and international mobility)
- What are the direct and indirect outputs and results achieved by MSCA so far? Quantitative and qualitative. Positive and negative. (at individual level)
- Did MSCA have any unintended effects at the individual level?

- What negative and positive factors influenced the achievements observed at the individual level and to what extent?
- To what extent did MSCA contribute to developing structured training, induction and professional development programmes for researchers?
- To what extent did MSCA contribute to strengthen networks at organisational level?
- To what extent did MSCA contribute to the quality of research outputs at organisational level? How did it strengthen organisational research capacity?
- To what extent does MSCA support exchange between universities that also collaborate in FP7/Horizon 2020? Does the MSCA and FP7/Horizon 2020 support similar or different research areas? Did this change over time?
- To what extent did MSCA (researchers' NIGHT) contribute to changing public perceptions of science and strengthening organisational efforts to disseminate research to broader public?
- What are the commercial results generated by MSCA projects at organisational level?
- What are the employment results generated by MSCA projects at organisational level?
- What are the direct and indirect outputs and results achieved by MSCA and predecessor? Quantitative and qualitative. Positive and negative (at organisational level)
- What negative and positive factors influencing the achievements observed at the organisational level and to what extent?
- Did MSCA have any unintended effects at the organisational level?
- How effective are the dissemination and exploitation measures of the M(S)CA results during and after the project, for different target audiences?
- To what extent have the MSCA activities/outputs/results contributed to and support the Horizon 2020 objectives of:
 - fostering excellence in scientific and technological research?
 - positioning Europe on the global map of research and innovation?
 - boosting innovation, European industrial leadership, growth, competitiveness and job creation?
 - addressing EU societal challenges?
- Did MSCA have any unintended effects at the system level?
- To what extent has the MSCA intervention contributed to the following cross-cutting issues:
 - enhancing the attractiveness of the research profession;
 - facilitating cross-border and cross-sector mobility of researchers;
 - interdisciplinary and cross-sectoral research and innovation;
 - responsible research and innovation;
 - gender dimension;
 - Open Science, Open Innovation and Open to the World;

- SME involvement in research and innovation and broader private sector participation;
- social and economic sciences and humanities;
- climate change and sustainable development;
- areas relating to bridging from discovery to market application;
- widening participation across the Union in research and innovation and helping to close the research and innovation divide in Europe.

A3.4 Evaluation questions related to Coherence (section 5)

- Internal coherence: Is the logic and structure of the MSCA efficient to drive activities towards the objectives? To what extent is the intervention coherent internally?
- Internal coherence: To what extent do the MSCA form part of a “holistic” approach within the framework programme? Are there any overlaps or gaps? How is coordination ensured with other parts of the framework programme?
- External coherence: To what extent is the MSCA intervention coherent with other EU interventions (e.g. Erasmus+, ESIF, EFSI)? What are the relations (complementarity, synergies, overlaps, gaps, etc.)?
- External coherence: To what extent is the MSCA intervention coherent with R&I activities carried out by Member States?
- To what extent does the MSCA intervention contribute to the European Research Area, to the Modernisation Agenda of Higher Education, to the uptake of the Charter and Code and the IDTP principles, and the Europe 2020 Strategy with its relevant flagship initiatives?
- To what extent is the MSCA intervention contributing to/reinforcing the Commission priorities in the ‘Agenda for Jobs, Growth, Fairness and Democratic Change’?

A3.5 Evaluation criteria related to EU added value (section 6)

- What is the additional value resulting from the EU MSCA intervention(s), compared to what could be achieved by Member States at national and/or regional levels? What does the MSCA offer in addition to what is available in terms of training, mobility and career development for researchers at both national and international levels? Can the MSCA objectives be better addressed at the EU level or at the national level?
- Would the activities be undertaken without the EU MSCA funding or with smaller share of the funding? If yes, to what extent?
- To what extent do the MSCA have structuring effects on the research community and policies in the EU? What are the areas where the structuring effects can be observed?
- Is the research cooperation created under the MSCA long-lasting and does it result in additional EU or national/international funding?

Annex 3 Case study write-ups

This section contains the write-ups of the case studies completed in the context of the present study.

A4.1 COFUND case studies

A4.1.1 COFUND case study – HERMES/Georg Forster Fellowships (COFUND)

A4.1.1.1 Introduction to the MSCA project

Table 60. Overview of MSCA project – Hermes/Georg Forster Fellowships (COFUND)

Name of project	HERMES/Georg Forster Fellowships (COFUND)
Name / type of the coordinator	Alexander von Humboldt Foundation (public-law foundation promoting academic cooperation between excellent scientists and scholars from abroad and from Germany), Germany
Name of Action	COFUND
Type of mobility supported under the COFUND project/programme	Geographic mobility (incoming) - fellowships/grants to non-residents of the country of the host organisation; only researchers from developing countries can apply
Introduction to project	The COFUND builds on and extends Alexander von Humboldt Foundation's Georg Forster Fellowship Programme. This programme is aimed at researchers from developing and transition countries, and funds research projects that contribute to transferring knowledge or methods to their respective home countries and thereby strengthen science and research in these countries.
Names / types of all other partners	No partners involved
Narrative on participating partners	No partners involved
Narrative on participating fellows	<p>The programme is targeted at "researcher with above average qualifications in a developing or transition country". This includes PostDocs, but also researchers holding already a professorship</p> <p>For this case study interviews were conducted with:</p> <p>Dr. Svitlana Kiyko, German Philology, University Czernowitz, Ukraine (Post Doc researcher from Ukraine who was financed to have a longer-term research stay at TU Berlin from 2015 to 2017)</p> <p>Prof. Steinmüller, German Philology, TU Berlin (host/cooperation partner of Dr. Kiyko. Professor at TU Berlin)</p> <p>Dr. Andriy Cherkas, Physiology of energy metabolism, Lviv Medical University, (PostDoch, research stay at Friedrich-Schiller-Universität Jena, Institute für Nutrition Sciences</p>

Name of project	HERMES/Georg Forster Fellowships (COFUND)
Project budget (EUR)	<p>from 2016-2018)</p> <p>EU funding amount: EUR7 million (for 2014-2018, 40% of total budget)</p> <p>Base funding from the Federal Ministry for Economic Cooperation and Development (BMZ): EUR10,5 million (for 2014-2018, 40% of total budget)</p> <p>Total project budget: EUR17,5 million (for 2014-2018)</p>
Start and finish date of project	Georg Forster Fellowship programme has been existing since 1997, COFUND received between 2009 and 2012 as well as between 2014-2018

A4.1.1.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The COFUND project HERMES builds on and extends the Georg Forster Research Fellowship Program by Alexander von Humboldt Foundation. The Georg Forster Research Fellowship Program was launched in 1997 to raise the chances for above-average qualified scientists from developing countries and emerging markets to receive research funding. It was established based on the insight that other programmes by Alexander von Humboldt-Foundation such as the Humboldt Research Fellowships did not always meet the special needs and difficulties of scientists from emerging economies and developing countries. Funding for the program comes from the budget of the Ministry for Economic Cooperation and Development (BMZ), which had previously funded longer-term stays of scientists from developing countries and newly industrialized countries through the award of Humboldt Research Fellowships.

The programme is based on the proven Humboldt Research Fellowship Program: Excellent scientists are supported throughout the world and across disciplines in individually tailored funding programs. As with the traditional Humboldt Research Fellowships, Forster fellows apply with their own research project, which they carry out on a German host institution in their own responsibility. The projects can last from six to twenty-four months. The project is meant to contribute to knowledge circulation and the establishment of long-term research cooperation. In addition, the knowledge acquired is meant to include aspects that are important for the continued development of the country or region of origin of the researchers.

The programme thus has a special combination of a focus on excellence and together with a development focus.

As part of their strategic targets, the Alexander von Humboldt Foundation has the explicit goal to foster scientific cooperation with developing countries. It has thus the motivation to raise additional funds to realise these goals. The co-funding from FP7 was thus a highly relevant source of additional funding to supplement the base funding by the Ministry for Economic Cooperation and Development (BMZ).

It should be noted that the programme is similar to the Marie Curie European Fellowships, although the objective is slightly different. Similarly, the EF promotes postdoctoral researchers for research projects in Europe for a period of 12-24 months. The research project should be an advantage or profitable for the home country of the scholarship holder as well as for the EU. The target group for EF is less limited in the country selection, but the two programmes could appeal to a similar target group. In

addition, the purely financial and material benefits are higher than those of the Georg Forster program.

Specifically from the point of view of the researchers the two programmes seem to build on the same motivation. Through the programme, research projects in Germany (or Europe, for EF) can be financed and thus research skills and career prospects improved.

The added value of MSCA funding

The Georg Forster Fellowship receives its “base funding” from the German Federal Ministry for Economic Cooperation and Development. With this funding 40-50 fellowships could be supported (41 fellows in 2012, 47 in 2013).

After being successful in COFUND, the number of fellowships was raised to 99 in 2014, meaning an increase in more than 100% compared to 2013. This was the approximate number of supported fellows also in the following years (up to 95 in 2016). Already with receiving EUR5 million co-funding via COFUND from 2009 to 2012, the Alexander von Humboldt Foundation was able to award approximately 100 additional research fellowships.

After being successful a second time in acquiring COFUND funds (EUR7 million for the period 2014-2018), the added value of MSCA was not only quantitative (i.e. increased numbers of fellowships), but also qualitative. The foundation could add several features to their programme:

- The Foundation could add the option of a subsidy for pension provision for fellows. This was meant to compensate for disadvantages associated with a fellowship compared to an employment contract.
- Additionally, a bridging grant to cover periods of unemployment in Germany was introduced for the same purpose.
- The fellowship now could also provide improved family benefits such as a lump sum of at least EUR400 for fellows who bring their children to Germany with them.
- Moreover, a subsidy towards childcare costs was intended to help improving the balance between research work and family life. Alternatively, fellows who care themselves for children under the age of twelve while working on their research project received the option to extend their fellowship by up to twelve months.

From the point of view of the coordinator, these additions, made possible via COFUND, made the fellowships much more attractive. This was clearly fed back to the Foundation by the fellows themselves. Subsequently, the foundation received a sizable increase in applications for the fellowship. In interviews, it was even mentioned that applications were clearly tailored to the specific submission dates to be eligible for the HERMES elements of Georg Forster fellowships.

It must be stressed that the additional benefits funded by HERMES were seen as extremely helpful and even unique compared to other support schemes.

- The AvH in general is seen by one applicant as a very family-friendly foundation, in terms of the framework conditions for researchers with children. The COFUND funds have made it even more attractive for an interviewed research fellow to apply for the scholarship. She has two children, so family support was extremely important and without these funds she could not have come to Germany.
- A host of a research fellow stated that the family support of the scheme was very special, this impressed him and was – from his perspective as long-time German researcher – very positive. After all, this family support makes it possible that the researcher families can come along with the researcher. This

affects the well-being of the researchers and also in turn has a positive influence on their scientific achievements.

Summing up, the added value of COFUND was both qualitative and quantitative: more fellows were funded and under more attractive conditions. This made it possible – according to the interviewed research fellows – to either come to Germany at all or to stay for a longer time since their families could be brought with them.

Because of previous experiences with EU co-funding, the Alexander von Humboldt-Foundation always intends to attract funds from the EU. EU funding was previously also acquired for Humboldt Research Fellowship for Postdoctoral Researchers, a similar programme, but without the focus on developing countries. The Humboldt Research Fellowship could be extended with additional 165 applicants over previously supported numbers. European funding was specifically relevant since national funds (through the existing financing by the BMZ) was already sourced and no significant raises were to be expected.

A4.1.1.3 Set-up and administration of the MSCA project

According to the interview with the Alexander von Humboldt-Foundation, the set-up of the project was some dimensions onerous, in other dimensions well manageable.

- On the one hand the application process required a lot of effort.
- On the other hand, the programme had already been in place since 1997. Therefore, no new partnership structure or similar arrangement with high coordinating costs needed to take place.
- On the administration after the approval, the coordinator mentioned that the administration does require effort. As an example, he mentioned the requirement that every fellow needs to be entered into a database. This generates administrative burdens.

In general the interviewed HERMES research fellows are not aware of specific administrative requirements that arose because of COFUND. There were some difficulties mentioned with the application procedures for the additional benefits financed via COFUND. There was specific guidance material on how the additional benefits can be applied for. However, in the beginning it was not clear to him how to apply for these elements (for all the benefits like child care support or pension plans the fellows needed to apply separately). He then contacted AvH and all the problems were fixed. Now this is much better, since the guidance material is clearer.

A4.1.1.4 The delivery of the MSCA project

The delivery of the project can be characterised as very decentralised. Scientists and scholars from all disciplines from developing countries, emerging economies and transition states (excluding People's Republic of China and India) may apply with a research proposal. The proposal must deal with issues of major relevance to the future development of the candidate's country or region of origin. This way the knowledge transfer back to the countries of origin is meant to be secured.

The research is carried out in cooperation with academic hosts at research institutions in Germany. Applicants choose their own topic of research and their host in Germany and prepare their research outline independently. Based on this research outline, candidates are chosen in a two-step procedure: first, two independent peer reviews of the proposal are requested. Second, a selection committee chooses the successful applicants. In the last few years, about one third of applications were successful

The delivery of the project subsequently takes place within the individual research activities.

There are no structured training / professional development courses offered by the programme. However, the Alexander von Humboldt foundation provides some support such as intensive German language courses for fellows and their marital partners prior to the fellowship.

In addition, the fellows become a member of the *Humboldt Family*. The Alexander von Humboldt Foundation tries to maintain close links to the alumni of our fellowship and award programmes. This includes different activities such as networking events abroad or an online network called Humboldt Life. All HERMES alumni automatically have access to the Alumni activities by Alexander von Humboldt Foundation.

A4.1.1.5 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

The Alexander von Humboldt-Foundation does not conduct research itself, but funds fellows to conduct research at a German university/with a host of their choice. Because of this programme set-up there are no direct impacts on research excellence at the organizational level. However, in the interviews one interesting aspect on the organizational level arose which can have effects on the way research is conducted:

In the process of negotiating the conditions for the COFUND funding support, the European Commission emphasized the fact that the research conducted needs to meet ethical standards (for example in the context of animal testing/animal experiments). In the past, this dimension was implicitly part of the selection criteria by Alexander von Humboldt-Foundation, but not in a prominent, explicit way. The comments by the European Commission, however, resulted in the concrete change in the programme so that the selection process included additional standards relating to ethical aspects: the fellows needed to address this aspect in more detail in their research proposals. This was a clear change/ a clear add-on in the research framework of the funded projects compared to the programme set-up before COFUND.

A further interesting aspect on impacts on research excellence can be noted. The HERMES/ Georg Forster fellowship is – as described above – designed to push knowledge transfer into developing countries. Because of this design, it is an inherent feature that also impacts on institutional or even systemic level in the developing countries are triggered. According to existing programme documentation and an evaluation of the Georg Forster Programme these effects indeed exist: The programme contributes to the strengthening of university systems in developing countries. They do so as the university systems benefit from the circulation of knowledge embodied in the research fellows. Internationally visible research and committed teaching increase the innovation and competitiveness of the science systems in the countries of origin. The high commitment of HERMES/Georg Forster scholarship holders is also reflected in the willingness to take over management positions within their universities following their research stay in Germany. Because of their outstanding achievements in research and teaching, HERMES/Georg Forster alumni thus represent important "change agents" in the university sector of the countries of origin.

According to the interviews, there are also effects on the organizational level of the hosting institutions. There seem to exist mutual learning processes between the research fellow and the host, co-operating with the fellow (see also below). Also the fellows extend the international spirit of the host institutions and contribute to an international open atmosphere at the host institutions.

Impacts on structured training and professional development programmes for researchers

As there are no structured training and professional development programmes for researchers taking place in HERMES, impacts are not to be expected in this respect.

Impacts on international collaboration / networking / researcher mobility

As the programme is designed as an international mobility fellowship, the impacts on researcher mobility are clearly an immediate outcome of the programme.

In terms of sustainability of the researcher mobility, it remains to be seen how the fellows funded with COFUND funds will act in the future in terms of mobility. According to the Alexander von Humboldt-Foundation it is so far not yet identifiable, how fellows funded directly with COFUND funds have developed after the fellowship.

However, based on the experience the Alexander von Humboldt-Foundation had before COFUND, the research stay in Germany seems to have often laid the foundations for longer-term scientific co-operation. In many cases, researchers which were already "mobile" were supported to strengthen their international co-operations. According to an evaluation of the programme, more than three-quarters of scholarship holders had already made contact with their host before the application for the fellowship, mostly through the Internet or joint symposia, with 10 percent already familiar with the hosts. In the interviews for this case study this was partly confirmed. In one case the research fellow had known his (future) host at a summer school and followed up on these contacts by applying for the scholarship. In the other case the research fellow only knew his host through his publications and contacted the host "out of the blue" with the cooperation request. After the fellowship application was successful, the support enabled her to have a close contact with her host. The interviewee stated that she had at least once to twice a month the chance to talk to her supervisor/cooperation partner during his office hours. Without the scholarship she obviously would not have had the chance to do so.

Impacts on business-academia collaboration / knowledge transfer

Because of the design of this project as a purely academic programme without clearly intended business-academia collaborations, there are no impacts on business-academia collaboration / knowledge transfer.

However, in a broader sense, there seem to exist clear effects of knowledge transfer between Germany and the countries of origin (developing countries) of the researchers (as mentioned earlier this cannot be attributed directly to the COFUND funds, but refers to the entire programme funded by both national and EU funds).

After returning to their countries of origin, the fellows continue to perform excellent research, but also teaching at universities. This way, the program contributes to the training and promotion of "change agents" (i.e. the university students). The programme thus has a "train the trainer" aspect. Additionally, the administration of higher education institutions themselves benefit from the fellows, as the fellows seem to be highly involved in university committees and show a high willingness to take over leadership positions.

However, the existing documentation points out that the knowledge transfer aspect could be strengthened if the career focus of the fellows was not too narrowly focused on academia. In addition to scientific excellence, there should also exist a self-understanding as "change agent" among the selected scientists. In this sense, the developmental effects of the program could be further optimized if the choice of scholarship holders were to include persons with a stronger self-understanding as "change agents" and not "only researchers".

Unexpected impacts at organisational level

According to one interviewee (a host of one of the research fellows) he did not expect such a high level of scientific excellence in Ukraine, given the recent conflict and difficult situation there. In this sense, it was an unexpected impact for the organisation/the host university to be able to host such an excellent researcher.

Impacts at the fellow / researcher level

Impacts on researchers' skills

From the sources consulted for this case study, the research stay via HERMES/Georg Forster Fellowship has triggered gains in the expansion of methodological competences and content. From an existing survey among fellows, more than 90% of the interviewees said that they had highly benefited from the stay in Germany, both in terms of research capacity, methodological skills, research results and the publication of these results. (Again, this result can not necessarily be linked to the EU funding via COFUND, because it is impossible to disentangle effects made by the national funding and the EU funding.)

In an interview with a research fellow a specific example was mentioned: The research fellow had the opportunity to work in the lab at his host institution with an "animal model" (a specific worm) which is available at his host institution, but not his home institutions. The interviewee stressed the fact that many different experiments can be done with this model, so this is very fruitful for him. He also stated that his presenting and writing skills have significantly improved. In addition, he participated at seminars and trainings at the university, they had a training for applying for funding in Germany and EU. These skills will be useful in the future as well.

According to the existing evaluation, the impact on skills has not necessarily happened in the sense of a one-way transfer from the north (German researchers) to south (fellow from the developing country). In many cases, not only the scientists from the Global South seem to have benefited, but also the German hosts. For example, scientists reported that they could learn not only from Germany and the German hosts, but also contributed their own knowledge positively and thus generate synergies. Mutual learning processes for the benefit of both sides and research and publishing "on the same level" seem thus to exist. This was clearly stated in talks with a host of an interviewed research fellow. This interview partner was clearly impressed by the contribution the research fellow from Ukraine could make in his research group in Berlin, especially in supporting younger colleagues at the PhD level.

In addition to the methodical, intercultural competencies are also promoted and the basis for a long-term commitment to the scientific location Germany is created. This is also reflected in the differentiated image of the host country (Germany) among fellows. A fellow interviewed for this case study positively mentioned the language courses offered by AvH and the "road trips" offered by AvH that were organised to help fellows to become more familiar with German culture.

Impacts on researchers' careers

With respect to the impact on the researchers' careers the existing evaluation of the HERMES/Georg Forster fellowship gives insights. Researchers mainly seem to have remained in academia, but have stepped up the career path significantly. Comparing the positions within the university hierarchy before and after the fellowship it can be seen that the scholarship holders had a significant career development. However, this cannot be attributed solely to the COFUND funds and not even to the HERMES/Georg Forster fellowship themselves: after all the fellows were carried out additional research stays and in often were promoted for their entire scientific achievements over many years. However, it can be seen that before the programme only 7% of the fellows had

a full professorship, after the programme this indicator is at 40% ("W3 professorships").

In the interviews carried out for this case study, the previously mentioned effects were confirmed. A fellow reported that she has received two job offers for professorships at universities in her home country: one at the Kiev Linguistic University, the other Lviv University of Civil and Disaster Protection. The fellow could also take over a Chair of Germanic, General and Comparative Linguistics at University Czernowitz, Ukraine. This choice for the research fellows illustrates the excellence of her research which was supported by COFUND.

In addition, the existing evaluation shows that around a third of the fellowship alumni carry out further stays abroad for research purposes after the end of the Forster scholarship. This also applies to further links to German research facilities. More than eight out of ten scholarship holders continued research co-operation with their hosts or the host institution / university after the research period. In addition, seven out of ten respondents maintained contacts with other researchers in Germany.

Unexpected impacts at researcher level

One of the researchers mentioned that due to his presence in Jena, unexpected cooperation took place. For instance, this led to a COST Actions application together with researchers from 20 other countries.

A4.1.2 COFUND case study - POLONEZ

For this case study draft, two interviews were conducted:

- one with the POLONEZ programme management at NCN,
- one with a research fellow.

For data protection reasons, contacting the fellows had to be organised by the NCN. To date, only one fellow agreed to talk to us for this case study. Overall, only a handful of fellowships have started already.

A4.1.2.1 Introduction to the MSCA project

Table 61. Overview of MSCA project

Name of project	POLONEZ
Name / type of the coordinator	NCN Poland (Narodowe Centrum Nauki / National Science Centre).
Name of Action	COFUND
Type of mobility supported under the COFUND project/programme	POLONEZ supports inter-sectoral, incoming geographic mobility by allowing researchers that are not residing in Poland to attend fellowships at Polish research organisations. By that, POLONEZ implicitly supports the reintegration of Polish researchers.
Introduction to project	<p>POLONEZ is the NCN fellowship programme, supporting international incoming researchers conducting basic research, regardless of their nationality.</p> <p>Researchers may apply for a 12- or 24-month fellowships in host institutions in Poland (both academic and non-academic, public or private). Apart from living and mobility allowances, the fellows receive a grant to cover the costs of the proposed research. The fellows are also given an opportunity to participate in a variety of research and non-research training programmes provided by the NCN and the host institutions.</p> <p>The NCN only coordinates the fellowships, i.e. provides funding to the fellows and the Polish host research organisations.</p> <p>Eligible for funding are researchers with a PhD degree or at least four years of full-time equivalent research experience, who have not resided or carried out their main activities in Poland for more than 12 months in the 3 years immediately prior to the call announcement. Researchers are not allowed to be permanently employed or to be Principal Investigators in Poland at the time of their application.</p>
Names / types of all other partners	NCN Poland (Narodowe Centrum Nauki / National Science Centre)
Narrative on participating	The National Science Centre (NCN) is a government

Name of project	POLONEZ
partners	<p>agency, supervised by the Ministry of Science and Higher Education, set up in 2011 to support basic research²⁵⁴ in Poland. Many processes of the NCN (e.g. in terms of recruitment/applications) follow the model of the ERC grants.</p> <p>With a budget of over EUR200 million a year NCN funds projects in Arts, Humanities and Social Sciences, Life Sciences and Physical Sciences and Engineering. The NCN has set up 11 types of funding schemes dedicated to researchers at different stages of their career. The NCN's goals are:</p> <ul style="list-style-type: none"> supporting excellent research projects in all fields of science and humanities funding doctoral scholarships and post-doctoral internships financing research projects carried out by experienced researchers aimed at implementing pioneering research important for the development of science inspiring international cooperation in basic research supervising the implementation of the awarded research projects <p>Pre-doctoral and doctoral researchers</p>
Narrative on participating fellows	The fellows are postdoctoral researchers conducting basic research, are not permanently employed and have not been working in Poland in the three years prior to the call.
Project budget (EUR)	<p>EU funding amount: EUR5.8 million (50% of the action's eligible costs)</p> <p>NCN funding: EUR5.8 million</p> <p>Total project budget: EUR11.7 million</p>
Start and finish date of project	2015/09 – 2020/08

A4.1.2.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

One of the Ministry of Science and Higher Education's strategies is to internationalise Polish research institutions. The COFUND project POLONEZ is connected to this national strategy as it is about internationalising research institutions either by allowing the institutes to access excellent international researchers for a fellowship or Polish researchers with international experience.

²⁵⁴ Basic research is defined as experimental or theoretical endeavours undertaken to gain new knowledge of the foundations of phenomena and observable facts, without any direct commercial use.

The NCN was approached by the Polish MSCA national contact point and was made aware that in principle, the activities of the NCN are eligible for MSCA funding. The NCN then decided to set up a completely new programme to match both the MSCA funding and the Polish needs in terms of internationalising the Polish research institutions. The NCN already applied with a similar project in 2014, but without success. The main lessons learned from the first application were to organise the structured training programme differently, i.e. for the NCN to organise training centrally, instead of leaving this to the host institutions to undertake. For the current POLONEZ project, the plan is that the training programmes will start in the second part of 2017, after the applications to the last POLONEZ call have been evaluated.

Even though the applicants are the ones that submit the proposals, they need to partner up beforehand with suitable host institutions. In the view of the NCN, the host organisations choose to participate in order to be able to host excellent researchers, and also to benefit from the administrative overhead funding²⁵⁵. For the host institution, it is easier to apply for EU funding at the NCN (in comparison to apply for other international funding directly at international bodies), as the NCN combines NCN/Polish rules and EC rules and the applicants are more familiar with the NCN/Polish rules and procedures and find it easier to apply in Polish than in English.

From the researcher side, MSCA grants are considered to be highly attractive as they are well funded and give the researcher the chance to manage their research project autonomously. The fellow interviewed was made aware of the funding opportunity at the end of the fellow's PhD programme and by the researcher that is currently the fellow's Polish team leader.

The fellow was very interested in the transnational character of the project, as going to another country is considered to be of high importance to learn new methods, improve language skills (English, to some degree Polish) and to enlarge their professional network. At the moment, the team the fellow works with is very international. In the opinion of the fellow, to go abroad and to work abroad are strong assets for their future career.

Both the coordinating organisation and the fellow interviewed considered the budget allocated to the programme and the fellowship sufficient to either realise the planned number of fellowships or the activities planned under the fellowship.

The added value of MSCA funding

Added value for the NCN

In the view of the NCN, without COFUND, there would be no POLONEZ. The NCN would simply not have the staff to administer such a programme. However, because the MSCA funding also covers an administrative overhead, it was a perfect opportunity for the NCN to not only attract excellent researchers to Poland but become able to administrate such a programme by hiring three new employees.

Furthermore, the NCN, saw the funding also as an opportunity to allocate higher salaries to the researchers funded by MSCA than to those usually realised within other Polish programmes. Two thirds of the researchers' salaries are MSCA funds, and the rest are funds from the NCN.

One big added value to the organisation in the view of the programme management was that they learned to write and prepare an application for EU funding. Even the first unsuccessful application was seen as a good exercise.

²⁵⁵ Overheads are 20% of the total amount of the research grant and salaries.

Added value for the host organisations as estimated by the NCN

The NCN knows of one other scheme similar²⁵⁶ to POLONEZ that was set up by a Polish organisation. In their view, the national scheme was less attractive overall, especially as it did not have the MSCA label. Both the national scheme and POLONEZ provided a similar level of funding for the fellows (i.e. a similar salary), but POLONEZ received in the end twice or three times as much applications. Interviewees explained the difference mostly with the positive effects of the MSCA label. The overall application procedure of POLONEZ followed the design of the ERC grants, i.e. when preparing the evaluation panels, they asked the same international experts to evaluate the applicants.

Added value for fellows

From the fellows' perspective, a MSCA grant always is very attractive, as it allows them to autonomously manage a research project, it is well financed, and gives an opportunity to go abroad to meet other researchers.

Without the fellowship, the researcher who was interviewed for this case study would not have been able to set up and manage a research project autonomously²⁵⁷. The fellow saw two alternative scenarios that could have happened without the MSCA funding:

Fist, the fellow considered it most likely that without COFUND, the fellow still would have worked in the same research group under the same team leader – but not in an autonomous project (i.e. in that case, funding would have come from the team leader's project and the fellow assessed this then to be "the fellow's independent project").

Second, as an alternative to MSCA funding, the fellow interviewed investigated the French grant Fyssen.²⁵⁸ With Fyssen, the fellow thought about working in Switzerland and on a similar topic. However, the Fyssen grant was smaller in terms of funding²⁵⁹ and would have been shorter (only one year). It was also considered to have less reputation than the MSCA fellowship.

A4.1.2.3 Set-up and administration of the MSCA project

Funding structure of the project

In POLONEZ, there are only two types of funds – COFUND (which covers the fellow's living allowance) and the NCN's own resources that cover the fellow's mobility/ family allowances and the research.

Within POLONEZ, they do not combine MSCA funds with the European structural and investment funds (ESIF). Initially, there was a plan to access these funds, which was also suggested by the NCP. However, the main problem was that the information on how to use ESIF opportunities did not reach the NCN. The POLONEZ team was at the conference of MSCA, and they were discussing ESIF opportunities there, but there was no overall guidance or best practices to follow.

The initial plan was to use the ESIF money for allowances, as one cannot fund the same category with two different European funds. From the perspective of the

²⁵⁶ Similar as the scheme also targets post-doctoral researchers regardless of their nationality but with a special emphasize on reintegration.

²⁵⁷ Otherwise, funding and therefore the research project would have been managed by the team leader and not by the fellow.

²⁵⁸ <http://www.fondationfyssen.fr/en/>

²⁵⁹ Annual maximum amount of 25 000 euros, intend to cover expenses of hosting, stay and health insurance.

POLONEZ team, the ESIF money would be an added value especially for the widening countries e.g. from Bulgaria, Romania, or the Baltics as they are in need of the additional funding. As the NCN is better funded overall, for POLONEZ, it was in the end not that important to be able to access additional funding from the ESIF.

Application and administration for COFUND

Regarding the COFUND application, the documentation was clear and the applicants received a lot of support from the NCP.

There is one thing that could be improved from the perspective of the NCN. There was nobody from the side of the EC that they could quickly call to discuss minor issues. Everything had to go via the NCP, and while they were very helpful, this seemed more complicated than necessary.

In the beginning of the project, the administrative side was to some degree challenging because the portal itself was difficult to understand, and not everything was clear at first sight. In the end, they got all the answers from the project officer. Now, for the ongoing project, it is working well so far. They have submitted an evaluation report, an ethical report, and research and dissemination reports. The financial administration is also very clear, as they receive a lump sum depending on the number of fellows accepted. Now it is very easy in comparison to other EU funded projects.

Administrative burden for fellows

From the perspective of the fellow interviewed, the administrative burden was acceptable. For some parts, the fellow was supported by the host university, but the fellow probably had managed also without this support.

For the fellow, it was the first time that they had had to handle a project's financial administration, which is also a learning opportunity that is expected to be useful in the future management of research projects.

A4.1.2.4 The delivery of the MSCA project (ongoing)²⁶⁰

POLONEZ is a NCN fellowship programme, supporting international incoming researchers working in the field of basic research, regardless of their nationality. It is targeted at researchers who may apply for 12- or 24-month fellowships in host institutions in Poland, both academic and non-academic, public or private. Apart from living and mobility allowances, amounting to EUR4,350 gross per month (and a family allowance of EUR300 gross per month, which will be paid taking due account of the researcher's family situation), they are offered a grant to cover the costs of the proposed research. The fellows are also given an opportunity to participate in a variety of research and non-research training programmes provided by the NCN and the host institution.

The NCN made three calls for POLONEZ fellowships, of which the last call is still in evaluation. The first fellowships started in September 2016. Overall, POLONEZ planned to fund 90 fellows. In the two calls evaluated so far, 74 fellowships are selected for funding. Because the programme was quite popular among researchers (the first call received over 400 applications), the NCN plans to fund 25 fellows more than planned. Those additional fellows will be funded only by the NCN themselves, but will otherwise not differ from COFUND fellowships.

POLONEZ funds basic science from all disciplines. The share of fellowships funded from Humanities and Social Sciences, Life Sciences and Physical Sciences follows the share

²⁶⁰ Data in this section (overall fellowships, disciplines, fellow's country of origin) was provided by the NCN. Analysis by Technopolis Austria.

of applications received. So far, POLONEZ selected half of the fellows from Physical Sciences and a quarter each from Humanities and Social Sciences, and Life Sciences.

By design, POLONEZ supports incoming and inter-sectoral mobility, i.e. fellows from a non-Polish organisation that become fellows at Polish organisations, both academic and non-academic. So far, the fellows selected for funding all chose academic organisations as hosts. Some of the applicants currently under evaluation chose also non-academic organisations. Among the fellows selected for funding, around half are Polish researchers coming back to Poland (similar to reintegration mobility). Overall, a large majority of fellows are Europeans.

The structured training/professional development will be delivered in the second half of 2017. The NCN is currently preparing a tender to find a suitable training facilitator. It is planned that the fellows can choose between three courses.²⁶¹ Based on the choice, they will probably be grouped in seven groups to receive different trainings.

A part of the training will be so called study visits, where fellows are supposed to visit relevant companies. Furthermore, the NCN intends to organise networking evenings allowing researchers to meet other researchers or also non-academic organisations who combine business and research. The host organisations are also required by the NCN to organise a study-visit with a non-academic partner. At the moment, it is not yet clear what other kind of training will be delivered. The fellow interviewed was therefore unable to assess the potential benefits of the training.

By design of the programme, the fellows are obliged to do activities aimed at popularising their research (and had to point out in their applications how to reach non-academic audiences). Usually, the fellows indicated that they want to teach, but fellows were also willing to organise workshops to disseminate their research results.

So far, the programme did not encounter any major difficulties in the delivery of the project. As the fellows have to move to Poland, some of them use the flexibility provided by POLONEZ to start their fellowships later than planned. This might be a difficulty in later stages of the project, as fellowships need to take place within the COFUND project duration.

In the POLONEZ application process, the panel is mostly international. The second stage is an interview via skype. The process differs only to a small degree from other NCN programmes. This is mostly because the NCN is a young organisation that was modelled after the ERC grants (especially regarding the application process).

A4.1.2.5 Impacts/expected impacts of the MSCA project

POLONEZ is ongoing and the first fellowships started only in September 2016. Therefore, in the following section, mostly *expected* impacts can be discussed.

Impacts/expected impacts at the organisational level

Impacts on project / programme funding and set up

At the level of the coordinating organisation NCN, COFUND had an impact on the recruitment of researchers and on the promotion procedures applied by the organisation. Due to COFUND, the online application system is now available in English making it easier for international researchers to apply for NCN funds. Furthermore, in comparison to the NCN's usual promotional activities, the procedures applied to promote POLONEZ are of higher quality and reach.

²⁶¹ It is not yet decided what kind of training will be delivered.

Researcher Recruitment

Due to the COFUND project, most of the researcher recruitment system is now available in English. Apart from that, the overall recruitment procedures are similar to the procedures applied by the NCN for the other domestic programmes, as the NCN was modelled after the ERC grants.

Promotion procedures

Due to the MSCA rules, they realised that the process to promote the POLONEZ fellows and overall dissemination of the programme is very important in attracting applicants. The NCN thought over the process of communication overall and thinks that that is one reason why the programme was so popular.

For each call, the NCN have organised an event in Warsaw targeting possible host institutions. They also organised a webchat targeted for potential fellows. For researchers that have not found a host institution, the NCN has prepared a match-making tool. Furthermore, the NCN promoted the calls in local newspapers, via the embassies abroad, on portals for people not in employment, and on scientific conferences. As a follow-up, the NCN plans to publish the research stories in the fall, because they would like to work with some magazines targeted at a wider audience.

Impacts/expected impacts on research excellence

The NCN in general does not carry out research on its own.

The NCN's impression so far is that the host organisations consider POLONEZ to be a great chance to collaborate with excellent researchers to the benefit of the host organisation.

Impacts/expected impacts on structured training and professional development programmes for researchers

The POLONEZ structured training activities are expected to impact on the overall ability and potentially on the willingness of the NCN to deliver such activities in the future.

For the NCN, it is the first time that they have coordinated a structured training and professional development programme for researchers. The training programme was the biggest challenge for the organisation when preparing the application for COFUND and is expected to lead to a lot of learning on the side of the NCN.

Impacts/expected impacts on international collaboration / networking / researcher mobility

The NCN has only limited insight in potential impacts on host organisations and can therefore not assess whether there will be impacts on international collaboration, networking or researcher's mobility.

Within POLONEZ, the NCN plans to organise a conference between the fellows, where they can meet, discuss and disseminate their research and strengthen their networks. This is expected to allow to probe possibilities for future collaboration between the fellows amongst each other, but also the NCN.

Impacts/expected impacts on business-academia collaboration / knowledge transfer

So far, no inter-sectoral mobility has been organised, therefore, no potential impacts could be observed.

In the future, the structured training to be provided could allow future business-academia collaboration by the case study visits or the networking events organised.

Unexpected impacts (observed so far) at organisational level so far

The NCN did not expect that the programme will be that popular. In the first round, they received more than 450 applications, in the next rounds a little less. One unexpected positive impact is therefore that the NCN will probably fund 25 additional fellowships. These additional fellowships will be funded solely by NCN funds.

From today's perspective, the NCN is going to apply again for MSCA COFUND to continue POLONEZ. But even if not successful, the NCN would probably try to set up a similar programme on their own as it was so far a very successful project.

Impacts/expected impacts at the fellow / researcher level

Impacts on researchers' skills

The fellow interviewed could already see some impacts on skills and expects several more to materialise during the fellowship. It was further assessed that collaboration with more senior staff was made possible by POLONEZ funding.

The fellow interviewed described skills that were already learned since the fellowship started a few months ago:

- The fellow participated in a workshop on telomere dynamics in Scotland (feeding in overall skill development of lab skills/analysis of telomere length).
- The fellow also had the chance to go to Strasbourg to collaborate with a lab and learned to measure telomeres there (as above).
- A collaboration with a Polish researcher on meta-analysis has also already started and the fellow gained knowledge regarding this methodology.

The fellow interviewed expects the following future impacts on skills:

- Because of the international character of the project, the fellow expects to carry out a lot of research activities internationally.
- One aspect will be to learn how to organise fieldwork, i.e. the monitoring of populations.
- Another aspect is the lab work connected to this, e.g. how to investigate the effects of e.g. stress on the animals. The fellow expects to acquire knowledge about genetic analysis on molecular level.
- The research topic that is approached by the lab work (i.e. the analysis of telomere length and of genomic variation) is a very current research topic, and those skills are expected to impact on the fellow's career positively.
- The fellow further expects the fellowship to be beneficial for the ability to work in an international team, both overall and by improving language skills. This is because the whole research team at the institute is working on the same research topic. During their PhD, the fellow was more or less the only researcher focussing on the particular research topic. In the research group, it is expected that there will be much more teamwork possible, which will require more communication in English.

Collaborations with senior scientists and key individuals is mostly realised by collaborating with the labs. Most likely, the collaborations with the labs were to a large degree possible due to the MSCA funding. The well-financed grant made it possible to actually travel to the other labs for between 3 and 7 days. Without the COFUND project, the collaboration might have been organised less effectively (i.e. online/not as a visit). With the funding, the fellow has the chance to meet each collaborator twice during the Postdoc-fellowship.

In the view of the fellow, with the MSCA grant and its high reputation, it was also easier to get partners to collaborate, and by that, to enlarge the fellow's network.

Impacts/expected impacts on researchers' careers

With COFUND, the fellow was able to manage a research project autonomously, build stronger collaborations and by that, realise more learning. This is expected to impact on the researcher's career overall as those experiences and skills are likely to be important when applying for a permanent position or follow-up postdoctoral funding.

Overall, the fellow expects the funding to make it easier to find either a permanent position or a follow-up fellowship after the COFUND project.

The following impacts are expected/have been already realised:

- Possibility to collaborate with senior researchers (realised to some degree and expected to continue);
- Stronger international network of scientists (realised to some degree and expected to continue);
- Ability to apply for further funding or a more permanent position in the researcher's country of origin (expected). These kind of grants are very popular and there is tough competition. To be able to show that a researcher found funding and organised a project autonomously was considered to be of high future benefit.

Unexpected impacts (observed so far) at researcher level

There were no unexpected impacts observed so far.

A4.1.3 COFUND case study – CS-GROWTH

A4.1.3.1 Introduction to the MSCA project

Table 62. Overview of MSCA project

Name of project	Fill in name
Name / type of the coordinator	Vinnova, national innovation agency, Sweden.
Name of Action	COFUND
Type of mobility supported under the COFUND project/programme (delete all that don't apply)	<p>Geographic mobility (incoming) - fellowships/grants to non-residents of the country of the host organisation.</p> <p>Geographic mobility (outgoing) - fellowships/grants to residents of Member States or Associated Countries. Outgoing mobility can be of two types: (1) from one Member State or Associated Country to another Member State or Associated Country; and/or (2) from one Member State or Associated Country to an (Other) Third Country, preferably with a return phase.</p> <p>Geographic mobility (reintegration) –fellowships/grants for reintegration of Member State or an Associated Country nationals having carried out research in an (Other) Third Country for at least 3 years, to establish them in a longer-term career after this transnational mobility period.</p> <p>Inter-sectoral mobility</p>

Name of project	Fill in name
Introduction to project	<p>The MSCA funding is implemented through the funding scheme <i>Mobility for Growth</i>. The programme aims at supporting career development for experienced researchers through mobility. Vinnova, the Swedish agency for funding of innovation, administers the programme. Host organisations and fellows apply together for one of three calls that Vinnova have arranged, which entail different kinds of researcher mobility:</p> <p>Marie Curie Incoming: funding for researchers to come to Sweden and create international collaborations</p> <p>Marie Curie Industry Outgoing: funding for researchers of all nationalities in industry or at research institutions to go abroad from Sweden</p> <p>Marie Curie Academy Outgoing: funding for researchers to go from Swedish academic sector to international private sector²⁶²</p> <p>Accepted applicants get funding from Vinnova, and all reporting and pay-outs go through the agency. Each host organisation contributes with half of the salary of the fellow, to ensure dedication.</p> <p>The programme is open for fellows from all disciplines, with at least four years of research experience.</p>
Names / types of all other partners	No partners.
Narrative on participating partners	n/a
Narrative on participating fellows	Experienced researchers within various disciplines within academia, research institutes or private sector who have a doctorate or at least four years' full time equivalent research experience.
Project budget (EUR)	<p>EU funding: EUR10 million</p> <p>Other funding: EUR25 million, Vinnova (Swedish Innovation Agency)</p> <p>Total project budget: EUR35 million</p>
Start and finish date of project	June 2012 – June 2018

A4.1.3.2 Rationale and added value of the MCSA project

Rationale for the project and participant motivations

²⁶² <http://www.vinnova.se/en/Our-activities/Innovativeness-of-specific-target-groups/The-Knowledge-Triangle/Mobility-for-Growth/>

- The coordinating agency, Vinnova, had explored the COFUND action for the programme VINNMER, predecessor of Mobility for Growth. At the time of the first COFUND call, Vinnova noticed that the profile of their programme was in line with the COFUND call, and after a few adjustments, they applied to make it a COFUND programme and subsequently, it was accepted. VINNMER was aimed at mobility of high quality professionals, and at the end of the VINNMER programme, Vinnova experienced a continued demand for programmes supporting mobility.
- Vinnova points out the valuable flexibility in the COFUND funding which enabled the creation of Mobility for Growth. Within Mobility for Growth, COFUND has enabled Vinnova to combine national and European prioritisations in order to create a programme that is attractive for the applying fellows and which creates increased transnational collaborations. Without COFUND, the programme would not entail any of mobility dimensions. Mobility for Growth is quite unique within Sweden, it is hard to find any equivalent when it comes to mobility options.
- The budget of the programme is considered to be a sufficient amount as the amount depends on the national programme it is aimed to strengthen. Here too, the flexibility is key according to Vinnova. It enables the programme to be relevant and attractive, as the effective implementation of a programme will require a certain amount of funding.
- According to Vinnova, the programme provides an excellent opportunity for countries from widening countries to establish a long-standing relation with organisations in other countries and create knowledge brokering effects, as the projects which are funded through the programme almost always continue after the initiated project.
- The interviewed fellows have had different motivations for applying to the programme. However, a main motivation for all interviewed fellows was that the programme offered mobility with flexibility, which made it possible for them to realise their own goals. This design was made possible due to the flexibility of the COFUND action. Different important aspects of the transnational mobility were aired in the interviews. One was the opportunity to establish collaborations between organisations and researchers working within similar fields in different parts of the world. According to one interviewee:
- *"I have been working within my field as a specialist for a long time, and there are not that many other professionals in this field in Sweden. I felt I needed to develop my competence, and myself"*
- The quote illustrates the motivation for an outgoing industry fellow, who was able to go to Australia and join a company with professionals within his own field.
- *"We met every now and then, and always said that we ought to do something together. He dropped me an email with the Vinnova fellowship attached and asked if it would be possible for me to come here."*
- The programme enabled the cementation and structuring of spontaneous collaborations, as illustrated by the quoted incoming fellow.
- Another interviewed fellow mentioned the possibility to work transnationally at more than one organisation, provided within the programme, as a motivating factor.
- Personal motivations existed among the fellows as well. For one interviewed fellow, the programme offered a possibility to move back to their country of

origin. Several of the interviewed fellows appreciated and thought the dimension within the programme which permitted them to bring their family to the host location to be essential.

- Career advancements were also mentioned as a motivating aspect of the programme. One of the interviewed fellows needed the experience abroad in order to apply for a position as an associate professor, others felt that the mobility experience would provide a general boost in their careers.
- For the participating organisations, the main motivation was the opportunity to tie competent researchers to their own organisation, and also to establish a long term, two-way exchange with a foreign organisation.

A4.1.3.3 The added value of the MCSA funding

For Vinnova the added value of COFUND is its flexibility, as it is adaptable to national prioritisations and allows for a range of mobility programmes. Additionally, the quality requirements from the European Commission connected to the programme tightened up processes within the organisation. The funding has also provided an international visibility which has helped attract international researchers.

As the details of the programme are set by the coordinating agency, Vinnova, many of the mentioned added values are connected to their design of the programme. However, the design itself is enabled due to the aforementioned flexibility that is built in to the COFUND programme.

For the host organisations, the programme is adequate for their own needs as well as the needs of the fellow. The possibility to establish an official long term collaboration with sought after professionals is an added value in itself. Furthermore, the deepened collaboration is argued to be incredibly valuable for the organisations, and rather unique for the COFUND programme, as it provides a prolonged and flexible mobility for the fellow. Without the COFUND programme, the host organisations would not be able to bring in the transnational element into their organisation and the same scientific output would not be generated, as the following quote illustrates:

"You are much more involved if you are there, face to face in the same lab. There is a lot of stuff that you cannot communicate via internet, and 2-3 weeks of exchange is not enough when you work on the edge of research."

The quote above illustrates one of the fellow's experience of the added value connected to the extensive mobility offered within the programme. Neither of the interviewed fellows have found any national mobility programme that would be comparable with Mobility for Growth on when it comes to duration of stay, possibility to bring family, to keep their work at their ordinary organisation, or supported an official position at the host organisation.

A4.1.3.4 Set-up and administration of the MSCA project

- Vinnova is the sole partner of the project. They argue that their ability to run the programme depends on their internal structures that comes from extensive experience in running research funding programmes. In relation to the funding amount, the administrative burdens therefore are nothing else than reasonable, especially since the administration is further simplified by the change in the reporting system from the European Commission, enabling Vinnova to report more nuanced levels of activity within the projects.
 - When it comes to administrative burdens experienced by the fellows, the effort is perceived more or less burdensome depending on whether the fellow is a researcher at a university or employed in a company. The interviewed researchers from universities does not experience any onerous

burdens relating to application or reporting, apart from some issues with language translations. But for the researcher in the private sector, the administrative tasks involve a substantive effort. The fellow and his colleagues lacked experience in tasks relating to applying for funding. Therefore it is more difficult for them to assess how application and reporting tasks should be completed. This is especially an issue internally within the company, as they do not have an established structure for how deal with issues relating to refunds of costs etc. Simplifications and guidelines from the coordinating agency would be beneficial.

- Vinnova appears to have the appropriate abilities and resources for coordinating the programme, producing good administrative efficiency without any remarks. Similarly, the interviewed researchers and organisations within academia are equipped with appropriate skills relating to administrative tasks. From the interviews undertaken for this case study, it is implied that it could be beneficial to provide extra support for fellows within private sector in their administrative duties, not the least during the application process, in order to secure their interest for the programme. This would fall under the responsibility of Vinnova. However, it should be mentioned that the interviewed fellow from the private sector chose the Mobility for Growth programme partly due to the relatively easier administrative burden, since EU funded programmes involve even more administrative work.

A4.1.3.5 The delivery of the MSCA project

- COFUND supports the national programme Mobility for Growth, which is run by the Swedish innovation agency Vinnova. Mobility for Growth funds research projects where international and inter-sectoral mobility is at focus. The programme is implemented by partnerships of universities, research infrastructures, businesses, SMEs and other socio-economic actors from different countries in Europe and beyond.
- The overall objective for the programme is to support career development for individuals through mobility. The programme funds incoming and outgoing transnational mobility for experienced researchers in private sector or academia between at least two organisations, as well as a reintegration phase for outgoing mobility. It promotes active and long term international collaborations between organisations. The host organisations have an active role, with responsibilities such co-applying funding, providing the fellow with official employment and paying half of the fellow's salary. According to information from the coordinator, all projects funded by the programme have so far resulted in continued collaborations between organisations.
- The programme supports highly skilled researchers and provides them with skills relevant to their research and for the private sector, preparing them to become future leaders in public and private R&I organisations. The specific courses or training the programme will support for each fellow is decided by each individual fellow and the host organisation. Whether or not this training is provided internally from the organisation or externally, depends on what the fellow and the host organisation requests.
- The programme does not have a specific research goal, but it aims at addressing the need of a highly skilled and gender equal workforce, which are prioritisations from the European Commission that goes hand in hand with national prioritisations. The programme holds certain requirements on the projects, they need to include beneficial aspects, but this is typical for Vinnova and national prioritisations, and less a result from the COFUND elements.

- The programme targets experienced researchers who hold a doctorate or at least four years' full-time equivalent research experience and are interested in mobility as their next career step. The programme is open for researchers within all research and innovation domains. As the programme will support gender equality, underrepresented gender may be given strategic preference in areas where there is a need to even out gender imbalances.
- No extraordinary difficulties have so far been encountered by Vinnova in the delivery of the programme. Only practical issues related to mobility aspects has come up, not related to the design of MSCA and COFUND.
- The fellows would not be able to attain the same training without their project which is supported by COFUND. Specific courses would be difficult for them to apply for on their own, and their respective project enables opportunities to train certain skills, which might not have been enabled otherwise.
- The recruitment process was organised by Vinnova, through their official web-page. It is an experienced and competent organisation with a solid infrastructure for research programmes. The fellows applied for funding of their projects and Vinnova's usual procedures applied. The process was considered to be open and transparent from the perspective of the interviewed fellows. It is pointed out that support from the coordinator was very valuable, as it helped them to produce good applications. However, the interviewed fellow from the private sector argues that the programme could probably attract more professionals in companies if it was more marketed towards industry.

A4.1.3.6 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

Vinnova, the coordinating partner, does not pursue any research of their own. However, they acknowledge that the projects funded via Mobility for Growth have impact, and they are themselves planning to conduct an impact study on the results of the programme.

The interviewed host organisations identify that the COFUND fellow has so far been beneficial for their respective organisations in terms of bringing in new methods and competences, attaining international contacts, and contributing to develop their own research in a strategically important field. They also state that the areas of research within which the funded fellows have been working has been strengthened as a result of the programme. Also, the work from the hosted researchers and their projects have inspired and influenced other researchers work within the organisations. These impacts are connected to the nature of the COFUND programme because they depend on a prolonged interaction between researcher and host organisation.

One of the interviewed fellows is in the process of applying for further funding, and uses and builds on the results from the programme to apply for this. So far, this fellow have published one, soon to be two publications.

Impacts on structured training and professional development programmes for researchers

From the perspective of the host organisations, the programme has not had any large scale impacts on structured training/professional development within their organisations. As the programme design allows the fellows themselves to choose what skills they want to learn or develop, the host organisation is not extensively involved and appears to not have picked up any training elements. Although, one of the interviewed host organisations, the Royal Institute of Technology, state that it has

been easier to attract other PhD students and post-docs to as a result of the work done through the collaboration with the fellow.

Impacts on international collaboration / networking / researcher mobility

Vinnova identifies that CODUND provides them with an international visibility, which helps them attract more applicants and get noticed in other contexts as well.

Owing to the prolonged stay and mechanisms for commitment on behalf of the host organisation, the mobility programme has produced many ongoing collaborations. According to the coordinator, all of the completed projects within Mobility for Growth have resulted in continued collaborations of some sort. These positive effects on transnational collaborations are validated by the interviews conducted for this case study. Gothenburg University states that the collaboration with a foreign organisation within the same area of research, but with slightly different orientation, opens up for combining of materials, methods and knowledge exchange which enables better research together, post-project as well. In practice, this extended collaboration involves the exchange of a PhD student between the organisations, which strengthens and further develops their methodology and overall collaboration.

"It appears that many of us have realised that we could benefit more from Horizon 2020 projects, and this programme was good in order for us to get pass the threshold."

The quoted host organisation, Gothenburg University, states that the programme has helped them realise the potential of international programmes. So far the COFUND project has provided the necessary inspiration and a figured as a good example which has resulted in increasing interest in several Horizon 2020 calls and other national mobility programmes.

Gothenburg University concludes that the specific profile of their fellow has had a positive impact on their internationalisation, as the fellow, who came from a large American university, could bring internationalisation effects both to the research and educational activities, as the specific nature of the programme has enabled the fellow to organise PhD student exchanges between the two organisations. This would not have been made possibly without the COFUND funding.

- From the perspective of the researchers, the COFUND programme has had impact on their international network as the funded projects put them in contact with professionals they would not have accessed otherwise.

Impacts on business-academia collaboration / knowledge transfer

The programme has had some impact on impact on business relations of fellows and host organisations. Interviewed host organisations already had involvement with the private sector prior to the project. However, it is stated that due to the industry orientation of the COFUND programme, the fellow and the project has created an increase in innovation interest within one of the organisations. It figured as an inspiration and good example for how innovations developed within the organisation could inherit potential to be developed into products that companies are interested in.

There is a variation in the impact on researchers' relations with businesses from the COFUND programme, due to that they were able to design their projects slightly differently. One of the interviewed fellows states that their project was less oriented towards businesses, and that they had only minimal contact with the private sector actor. Another interviewed fellow has experienced a great added value from the company involvement in their project. The orientation of the programme was a push that initiated more business interaction. Now, the fellow has gained knowledge on contract research and enabled contact with certain businesses that will continue after the project.

There has so far not been any filed patents or other IPR as a result of the project.

Unexpected impacts at organisational level

As far as this study can tell, no unexpected impacts were identified by the host organisations.

Impacts at the fellow / researcher level

Impacts on researchers' skills

"I have added a whole new branch of techniques that complement my expertise"

The quote above illustrates the beneficial effect of the Mobility for Growth the interviewed fellows' skills development. The opportunity to take part of another organisations' methodologies and share one's own, has produced synergy effects where all parties have been able to develop themselves scientifically. As for soft skills, the interviewed fellows have so far benefited from training in leadership skills, presentation techniques, organisational knowledge and corporate knowledge. These acquired skills have so far helped the fellows to enable business relations and has been used as a basis for applications of further project funding.

One interviewed fellow had been situated in a company and the experience brought new perspectives on the field and way of work, network development within the host country, language improvement in technical English vocabulary and a clear view of company strategies and what needs to be done within the research sector. Through the project, the fellow was able to develop a way to study a certain phenomenon, which is important for career development. Additionally to the funding, the project provided motivation to spend time and raise performance. These positive effects would not have been attainable without the COFUND project.

- As for contact with key individuals, the interviewed fellows whose projects meant a prolonged stay in a host organisation, had developed close contact with key professionals, which has helped them reach scientific output, new positions within their host organisation and the new business contacts.

Impacts on researchers' careers

As for impact on career development, it is still arguably too soon to talk about any major impacts from the COFUND programme. But it is stated by one researcher within academia that the programme provided an essential push, through establishing collaborations with businesses which resulted in further engagement with the private sector. COFUND enabled this through the business orientation of the programme.

Other impact from the programme has been two publications and related scientific output which is used for applications of further funding. The quality of the scientific output has been dependent on COFUND as it opens up for prolonged and deepened interaction between the parties.

For the interviewed fellow who stayed abroad in a business, career advancements are expected in the long run thanks to a methodology development from the COFUND project.

Unexpected impacts at researcher level

Only a few statements were made about unexpected impacts. The interviewed researcher who had done the stay abroad in a business noticed that it did take some time to reintegrate into their organisation after their stay abroad. Although, the experience abroad has been viewed as a positive thing overall.

Another fellow mentions that the business collaboration turned out better than expected, and there was an unanticipated possibility to keep PhD students and get

them enrolled in a double affiliation, which had the effect of making PhD positions more attractive.

Interviews

Project Coordinator	Erik Litborn 230217
Fellow	Cecilia Williams 020317
Fellow	Thomas Croneis 020317
Fellow	Christian Fredriksson 030317
Host organisation	Amelie Eriksson Karlström 060317
Host organisation	Anders Ståhlberg 020317

A4.2 IF case studies

A4.2.1 IF case study – BIO-ELECTRO-ETHYLENE

A4.2.1.1 Introduction to the MSCA project

Table 63. Overview of MSCA project – BIO-ELECTRO-ETHYLENE (IF)

Name of project		Integrated Bio-Electrochemical Production of Ethylene through CO ₂ sequestration (BIO-ELECTRO-ETHYLENE)
Name / type of the coordinator		Vlaamse Instelling voor Technologisch Onderzoek N.V. (VITO) (Belgium).
Name of Action		IEF (Intra-European Fellowships for Career Development) FP7 PEOPLE- 2013 MSCA
Introduction to project		This project was intended to develop the process of production of ethylene, a biofuel, through an integrated bio-electrochemical production system. The system seeks to produce ethylene through CO ₂ sequestration, converting waste/waste water and CO ₂ utilising suitable bio-cathodes. These cathodes are part of a bioelectrochemical system (BES), which under specific conditions are able to undertake reductive catalysis of CO ₂ to form organic products, which in this case reduce to ethylene. The objectives of the project also include developing an understanding of process economics of the system based on the preliminary results.
Narrative on participating partners		VITO is an independent research organisation, focusing on cleantech and sustainable development. The research covers a range of areas from energy, materials and chemistry, to health and land use. The research projects of VITO are conducted in countries around the world, and include a number of European level projects. With a customer-orientated direction, VITO provides technological solutions and advice to support and encourage sustainable development, underpinned by the research they conduct. The institute also offers training courses for managers and policy makers in the areas of air

Name of project	Integrated Bio-Electrochemical Production of Ethylene through CO₂ sequestration (BIO-ELECTRO-ETHYLENE)
	<p>quality management and water quality management.</p> <p>As an organisation VITO has used European funding for many years and applies through many different funding streams. VITO has a particularly strong history of encouraging applications for Marie Skłodowska-Curie Actions (MSCA) and offers a range of potential subject areas eligible for funding. VITO also offers additional ongoing support throughout the application process. The current coordinator of this project previously managed another IEF funded project.</p>
Narrative on participating fellows	<p>The researcher has many years of experience in the field of the project as has co-authored numerous publications supporting this type of research. Prior to the MSCA Fellowship, the fellow was a post doctoral Researcher at INRA-LBE.²⁶³</p> <p>The participating fellow is currently the Chief Scientific Officer at Innotech Interventions, India (http://innotechin.com/).</p>
Project budget (EUR)	EUR177 000 ²⁶⁴
Start and finish date of project	May 2014- April 2016

A4.2.1.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

VITO, as an independent research organisation, works in a number of research areas, one of which is the development of commercially viable electrochemical platforms for the production of crucial (bio) chemicals. A specific aim of this area of research, and thus the project, was to strengthen the understanding of the microbial electro-synthesis process (MES). The rationale for setting up the project was to understand the behaviour of the bio-cathode within the MES process, at the laboratory scale, with the goal of testing the possibility for larger scale (industrial) MES processes in the future. This process involves the production of ethylene from CO₂, using a bio-cathode enriched microbial consortia.

With their focus on research, VITO are always looking for high calibre researchers to conduct and contribute to their work. In this context, the project coordinator viewed the MSCA as an opportunity to attract excellent researchers from around the world who might be able to tackle this project.

The motivation to become involved in this project was similar for the research fellow, who primarily sought out the opportunity as a way to gain new skills and experience through working with researchers from other countries. The opportunity was deemed attractive as it provided an environment in which the fellow could collaborate and

²⁶³ <https://www6.montpellier.inra.fr/narbonne>

²⁶⁴ http://cordis.europa.eu/project/rcn/191384_en.html

interact with other high calibre researchers, and learn about different methods and techniques which are of interest to the research area.

The research fellow was additionally motivated by the opportunity to progress his career in the field. Given the narrow focus of the research, there are few research groups in the world with strong capabilities in this area and many of them are in Europe. There are only around 10 research groups in the world working on this topic and VITO is considered to be one of the best. As such, the next step in the fellow's career would have required him to move to be close to one of these groups. The fellow was aware of the reputation and research capabilities of VITO within this area and was looking to expand on his skills with the more industrially orientated approach undertaken by VITO.

This motivation was also underpinned by the recognition of the reputation of the MSCA funding and the prestige that would come from being an MSCA fellow.

There are also benefits identified for the project coordinator. The project provided an opportunity for the coordinator to lead a project independently within the organisation. As it does not involve other partners, the project could be uniquely defined and tailored to the needs of the coordinator, in alignment with his own research area. Within this project, the coordinator supervised 4 researchers, corresponding to a workload worth of 35 person months. The coordinator was an experienced supervisor having worked with a number of researchers in the last 10 years, many of whom have been recipients of funding, including from MSCA (2), other EC funding (5) and national public funding bodies (4) as well as university fellowships (3).

The added value of MSCA funding

The MSCA programme was particularly appealing to the project coordinator due to its openness to applicants from outside of academia, in the end though, the recruited fellow was from an academic background. Also while alternative funding sources are available at a national level in Belgium, the MSCA allowed for the project coordinator to make the offer available to a wider pool of experienced individuals. Furthermore, and more importantly for the project coordinator, the MSCA attracts researchers from abroad. Without the MSCA funding, seeking out other pathways such as bilateral funding programmes would have been a priority, but they are more difficult to identify and fit to project needs. The coordinator also applied for European Research Council (ERC) funding toward the end of the MSCA project, but was unsuccessful (after the interview round).

Both of the MSCA projects managed by the project coordinator were awarded under FP7 and despite applications made under H2020, he has been unsuccessful in gaining further funding at this level. He feels that this may be attributable to the increased levels of competition for funding under H2020 and the preference given to Europeans researchers over their non-European peers (the fellow in this project was of Indian origin).

Overall, although part of the project might have been able to go ahead without MSCA funding, the coordinator believed it is unlikely the same calibre of researcher could have been attracted to the research team using other available funding channels (except potentially with an ERC grant).

In the future, the coordinator hoped that the experience with the MSCA funding will also provide the opportunity for more certain success with the ERC application process.

For the research fellow, the added value of the MSCA funding was the international aspect and the flexibility in which potential host institutions he may join. Though he

was looking at other funding options, these other programmes were national level programmes and were more prescriptive in the location of the fellowship.

A4.2.1.3 Set-up and administration of the MSCA project

From the perspective of the coordinator, the administrative aspect of fellowships is not too burdensome. He has experience across a number of MSCA projects. In the context of this project, the experience of the project coordinator was positive. The fellow has also been involved in the administration and noted the administration during project was straight forward and that VITO was very supportive of the necessary requirements. The high level of administrative support and organisation from VITO reflects their experience in coordinating EU level funded projects. This sentiment was such that a further reduction in the administrative requirements of the project was not considered necessary.

In contrast to this experience, the application process was very complex for the researcher, requiring a number of different components. In this instance, the fellow found information days and workshops regarding the application to be very helpful.

The burden of delivery for the MSCA funding was considered to be entirely manageable. Certain aspects, especially the budget and the salaries of the staff, of the fellowship, were non-negotiable. However even after tax, the salaries of the MSCA fellows in Belgium were thought by the coordinator to be attractive. These salaries are on a par with other postdocs, which from the perspective of the fellow was adequate. The fellow also noted the additional mobilisation allowance was very helpful as it allowed him to attend conferences more easily. As such, there were no notable issues pertaining to the delivery of the project and it seemed to go well. Given that the project coordinator has supervised other MSCA fellows, as well as numerous other researchers funded by EU level programmes, he has a lot of experience in completing and managing these aspects of the project.

The budget for the project was fixed and not open to negotiation, however it was perceived to be acceptable from the coordinator's perspective. Although the project went slightly over budget because the costs that occurred towards the end of the project were higher than anticipated, the extra funding required was covered by the internal resources of VITO.

A4.2.1.4 The delivery of the MSCA project

In order to ensure the recruitment was open and transparent, an announcement was made on the VITO website regarding their intention to recruit a fellow and to prepare a proposal. Given the very similar subject matter of the fellow's previous publications and the project subject matter, the coordinator was already familiar with the fellow prior to the announcement. As the fellow was living in France at the time, the recruitment process was relatively simple and according to the coordinator went very smoothly. The fellow also found the recruitment process to be very simple due to prior contact with the project coordinator.

The fellow moved to Belgium for the duration (2 years) of the fellowship where the main goal was to create a system to transform CO₂ into ethylene. During the fellow's time at VITO, the research was taken to the next level and he was responsible for initiating novel methodologies for the technical process involved.

The training offered to the fellow as part of the fellowship was organised into two parts: the training delivered internally by VITO, and training delivered by external providers. The former consisted of training courses to support the development of scientific skills, regularly organised by VITO. VITO additionally provide highly structured courses and training for researchers for all new employees. The fellow had access to both these courses and extra training offered by colleagues at VITO.

Furthermore, the fellow had to regularly follow up on projects by presenting research results.

To encourage career development, the fellow was sent on training days with external providers. These training days covered topics such as intellectual property rights training and proposal writing training. The funding for the courses came from the MSCA project funding therefore they could not be continued following the end of the project. These training courses seemed to offer strong added value for the fellow and as such, reflect a beneficial aspect of the programme that the fellow would not have had access to otherwise.

Furthermore, VITO and the supervisor offered support in helping the fellow finding his next job after the fellowship was complete. However, this proved unnecessary as the fellow found a job through prior industry contacts.

The project did not encounter any organisational difficulties, partially aided by the support offered by the European Commission, and their rapid response to any of the project coordinators questions, and the coordinators regular contact with the National Contact Point, which also supported the project implementation.

A4.2.1.5 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

The first impact of the project happened during the set up phase (literature review) where it became clear that certain aspects of the work plan needed to be adjusted. In response to this, the fellow came up with a standardised protocol for the work which is still used by the researchers at VITO. The novel methodology for the MES process, initiated by the fellow, was later published and supported the publication of other reviews and book chapters in highly reputed journals and books. As such, the development of this protocol, the contribution it made to the laboratory R&D department and the good reputation it afforded the research team reflects one of the most important impacts of the project.

The impact on the field of research and its standard of excellence was also greatly improved as the project was able to provide evidence to prove a concept which was previously only a hypothesis. For example, the project achieved higher productivities and carbon conversion efficiencies for acetate production, which has served to provide a benchmark target in the research field.

The project has a strong publication output. This improves not only the organisations depth of knowledge in the field, but the visibility and reputation of the research organisation. As a result of the project, a total of 8 publications were made in addition to 4 chapters and 11 conference presentations and proceedings.

The project has also influenced the direction of the research organisation, as they are now seeking to do research into more challenging molecules. As the project only ended in April 2016, it is still too soon to see the full impact, however, both the coordinating organisation and the fellow have gone on to publish additional papers with their respective teams since the completion of the project.

The publications and other means of disseminating project results supported additional proposals and collaborations at both European and international levels. The fellow supported team members in writing proposals in this field of research during the project. The organisation has therefore been placed in a good position to apply for future research funding. The first MSCA research fellow supervised by the research coordinator has since gone on to work full time for an oil company in the R&D department and the coordinator still collaborates with him.

Impacts on structured training and professional development programmes for researchers

The research group that benefited from the MSCA was a small team, consisting of employed researchers and postdocs. The project coordinator was additionally responsible for supervising PhD candidates. Given the small size of the team, the presence of the fellow also offered the PhD candidates further support and guidance, opportunities for collaborating and exchanging ideas. This was particularly true for one PhD candidate who was using the same technical process as the fellow. The fellow also contributed to the wider teaching offered by VITO, supervising 3 masters' and bachelors' theses working in conjunction with the research institute.

From the perspective of the project coordinator, the MSCA project had a positive impact upon VITO's capacity to provide structured training within the organisation. Training and working with the fellow gave the coordinator experience, who then applied the lessons learnt to other training courses across the organisation.

Within VITO there is a fixed plan for recruitment and as such, the structure of the MSCA programme has not had a significant impact upon their general recruitment process.

Impacts on international collaboration / networking / researcher mobility

The project coordinator reported that involvement in MSCA was very beneficial for developing connections with other researchers, particularly through the workshops and programmes offered by MSCA which foster personal connections. Furthermore, the fellow was also independently motivated to do a lot of networking, both within VITO and with other researchers. In doing so, he is also responsible for some of the long-lasting contacts with researchers formed which are still used by the fellow himself, and the project coordinator.

The project facilitated more connections to be made between VITO and HEIs, both within Europe and across the globe. This is reflected in the dispersed locations of the co-authors on some of the publications generated as a result of the project, involving researchers from across the world. With collaborative partners reaching as far as Egypt and Australia, this demonstrates how the MSCA project facilitated international collaboration.

Impacts on business-academia collaboration / knowledge transfer

The project had a very good impact on the VITO's connections with other institutions. The contacts made through the project facilitated contact between VITO and HEIs across Europe and included some individuals of good reputation within the field. These new connections also extended to include 2 private companies and 1 research centre.

The final target for the project involves the successful commercialisation of the results. In order to achieve this target, the research team at VITO is currently validating the project results. As such, though the project results have not yet been commercialised, the system is now commercially viable. The company the fellow now works for are applying the knowledge gained through the fellowship to continue to develop a system built on the same scientific principles.

Unexpected impacts at organisational level

According to the project coordinator, there were no unexpected impacts, at an organisational level, of the programme.

Impacts at the fellow / researcher level

From the perspective of the project coordinator, the fellow was very involved with the host organisation and project team. He became an important voice in discussions,

took part in conferences, representing VITO, and cooperated and communicated very well with other researchers within the team and the host organisation. As such, it seems that the fellow was very engaged with making the most out of the fellowship experience and giving back to VITO.

The impacts on the fellow were significant and included the development of personal and scientific capabilities, experience of working in such projects and the opportunity to expand his personal network of contacts in the international research community. This can be partially attributed to the researcher's engagement with the project and conferences, and the research capabilities of VITO. Indeed, there are less than 10 research groups on the world working within this area and VITO is known to be one of the first in the world.

The added value of attending conferences was such that the fellow was able to talk directly to other researchers within the field, giving the fellow the opportunity to learn more about the research that is not available in the researcher papers alone. Furthermore, it fostered his connections with the international research community, reflecting his motivations for choosing the MSCA in the first place.

While, there were no unexpected impacts of the fellowship, the fellow noted that there were some difficulties in getting results, and that it took some time to overcome these issues.

Impacts on researchers' skills

According to the project coordinator, the recruited researcher came to the institution ready to learn and demonstrated a high capacity to develop new skills and benefit from the training. These new skills were highly transferable and were of significant benefit to the fellow.

In regularly presenting the research, both internally and externally, at conferences and invited talks, the researcher was given the opportunity to develop his presentation and communication skills. In doing so, this additionally gave the fellow opportunity to develop his networking skills, which he did so to great success.

The external training days and internal support offered by VITO helped the fellow to develop his grant writing skills, which he was later able to use to support other members of the research team in their grant applications. The fellow thought this to be very helpful and complemented the patent expertise he had accessed while at VITO.

Given the wide scope of VITO research interest and capabilities, the fellow felt he learnt a great deal about effective communication and proposal writing to incorporate interdisciplinary sets of knowledge. Exposure to such a wide range of disciplines was very valuable for the fellow, and being given the chance to communicate and work with people from a wide range of disciplines was important for understanding how to bridge the divide with other research areas. This was thought by the fellow to be one of the most helpful skills acquired because the subject area includes many different types of information like chemistry and materials science.

VITO's industrial orientation gave the fellow experience and knowledge about IP and patenting. This was aided not only by attending workshops and external training, but by speaking with colleagues at VITO. This experience was underpinned by the industry orientated focus of VITO.

As the development of technical skills were an important part of the project, it follows that this was strongly developed from working with the system and becoming more familiar with the way it works. The fellow noted that these things rarely work how you think they will. As such, this project allowed the fellow to develop the tacit skills required to take the system through to its next stages of development.

Following the awarding of the project funding, there was very little contact between the fellow and the EC. It was thought by the fellow that the MSCA programme could have benefited from more feedback during the project itself, and the fellow would have liked more information on how to access the wide range of services and research communities provided and brought together under the Commission programmes, other than the MSCA. This included, for example, the range of workshops and events coordinated by the European Commission established to benefit networking opportunities for researchers across a range of programmes in the whole Horizon 2020 instrument. The fellow felt that this would have been a good opportunity to meet other members of the research community.

Impacts on researchers' careers

The fellow was able to gain experience in developing and upscaling projects of this size which provided him with additional confidence in his technical and project management skills. This has no doubt been an important skill to develop for his new role. His high levels of productivity, communication and group leadership skills, as well as high capability for training and teaching skills, allowed him to capitalise on the MSCA experiences.

His new role is that of chief scientific officer for a start-up company in India. The company is seeking to commercialise the MES system, and is therefore directly linked to the results of the MSCA project, allowing the fellow to continue his work. As such he works on upscaling and the continued development of this technology, applying the skills and knowledge gained during the project, and through the practical experience of developing the product. However, had the fellow not found a job after the MSCA project has finished, he would have most probably received support from VITO in securing another role outside of the company.

The funding from the MSCA project allowed the researcher to attend a range of international conferences, facilitating networking for the fellow. This was valuable, as interaction with international researchers was one of the primary ambitions of the researcher to engage with the project. The opportunity to interact with other researchers outside of the project group is valuable as it allows for the researchers to exchange knowledge that cannot be contained within research papers.

The network of researchers from around the world is perhaps one of the major benefits of the MSCA project, serving to develop strong connections and collaborations between talented and enthusiastic researchers which will only enhance their career prospects for the future.

Though he has now moved back to India, he is still in contact with some of the researchers he met through these mobile experiences. As such, this reflects a longer term impact of the fellowship and the benefits it provided for the fellow to increase international links.

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A4.2.2 IF case study – MUIMME

A4.2.2.1 Introduction to the MSCA project

Table 64. Overview of MSCA project – MUIMME (IF)

Name of project	MILK BANKING AND THE UNCERTAIN INTERACTION BETWEEN MATERNAL MILK AND ETHANOL – MUIMME MSCA-IF-EF-CAR – CAR – Career Restart panel
Name/type of the coordinator	University of Central Lancashire (UK)
Name of Action	IF
Introduction to project	The project aims to discover the medical risks of donated breast milk. Using interviews, archival data and ethnographic studies, the MUIMME project examines milk banking, focusing in particular on the issue of trust. Supporting a highly-qualified experienced female researcher to return to the academy following a maternity/career break, this project relates directly to women and science in society. MUIMME is an old Irish word for wet-nurse.
Narrative on participating partners	<p>The University of Central Lancashire (UCLan) in Preston was founded in 1828 as the Institution for the Diffusion of Knowledge. 'Ex solo ad solem', translated as 'From the Earth to the Sun', has been its motto ever since – UCLan aims to help people from all walks of life to make the most of their potential. UCLan is one of the UK's largest universities with a student and staff community approaching 38,000. Internationally UCLan has academic partners in all regions of the globe and it is on the world stage that the first class quality of its education was first recognised.</p> <p>The MUIMME project has been coordinated by Professor Fiona Dykes, who leads the Maternal and Infant Nutrition and Nurture Unit (MAINN) at UCLan and is convenor of the annual three-day international interdisciplinary MAINN Conference. She holds visiting professorships at Dalarna University, Sweden, the University of Western Sydney and the Chinese University of Hong Kong. Professor Dykes has a particular interest in the global socio-cultural and political influences upon infant and young child-feeding practices. The MUIMME project has been her first EU-funded project.</p>

Name of project	MILK BANKING AND THE UNCERTAIN INTERACTION BETWEEN MATERNAL MILK AND ETHANOL – MUIMME MSCA-IF-EF-CAR - CAR – Career Restart panel
Narrative on participating Fellows	Dr. Tanya Cassidy is a Canadian born, Irish naturalized, sociologist who received her doctorate from the University of Chicago, and has extensive teaching experience and an active research programme linked to the sociological social psychological study of health, gender, culture, family and food issues. In addition to recently joining the MAINN team, she co-organized an interdisciplinary conference on motherhood and culture at Maynooth University (IE). During her career she has been invited to present papers at meetings on both sides of the Atlantic, and to participate in an European Science Foundation (ESF) workshop on alcohol and culture.
Project budget (EUR)	EUR195 454.80
Start and finish date of project	April 2015 – March 2017 (ongoing)

A4.2.2.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The Milk Banking and the Uncertain Interaction between Maternal Milk and Ethanol (MUIMME) project was selected in 2014 by the MSCA "Career Restart" panel. MUIMME has been coordinated at the University of Central Lancashire (UCLan) in the UK and the project still continues. Career restart was also the Fellow's primary motivation to apply for the funding and to submit the proposal. However, there is also a powerful personal storyline behind the project.

The main impetus to apply for MSCA funding and submit a proposal for this project came from the Fellow (Dr. Tanya Cassidy) who approached the coordinator (Professor Fiona Dykes) with a proposal during FP7. However, the origins of the motivation of the Fellow to seek funding for this area of research (human milk donor banks) date back even before FP7 funding. The Fellow had been working on similar research topics for a long time before applying for the EU funding – for example, she participated in the Cochrane public health fellowship in Ireland.

Canadian by origin, Dr. Cassidy has lived in Ireland for 20 years. As she was returning to work after maternity leave, she wanted to restart her research career and so was looking for opportunities. She believed that the area of milk banking urgently needs more research and data, and began applying for research funding. She originally applied to the Wellcome Trust (a UK charity) and received very good feedback from one of the academics on the panel but did not get the grant as her researcher integrity was questioned in the light of her personal experience. She then continued looking up for further partners, and was also considering applying for funding in Canada.

The Fellow ultimately decided to apply for FP7 funding. She considered a couple of other people to work with on the FP7 proposal but finally chose Professor Dykes at UCLan, whom she had known from earlier collaboration. For Professor Dykes and UCLan, the main motivation to participate was to facilitate the Fellow's return to academia. Furthermore, the fact that the MSCA funding is considered a very prestigious type of research funding, both for individual researchers and for research

institutions, played its role in the decision process. The submission of the application was also driven by the Research Excellence Framework (REF),²⁶⁵ for which UCLan needs high-quality publications and the evidence of trans-disciplinary research.

Together, Professor Dykes and Dr. Cassidy submitted an application to FP7. The proposal included a mobility element (the Fellow was supposed to go to Canada to do part of her research there). However, this proposal was unsuccessful. The Fellow had already some contacts in Europe (mostly in the UK) so when the new programming period (2014–2020) began, Professor Dykes and she prepared a new application to Horizon 2020. They also followed the advice of the Irish MSCA National Contact Point. This time, the application was successful. UCLan received the funding for the project and the size of the budget allowed the team to launch the planned research activities.

Both the coordinator and Fellow believe that had it not been for the MSCA funding, the research in the area of milk banking would not have been possible to undertake to this extent. UCLan would have needed justification for the cooperation (e.g. by having some funding) to be able to conduct research together with the Fellow, because UK universities are increasingly running based on business models. The work would have never been as systematic without the MSCA funding and the Fellow might have given up on work in this area.

The added value of MSCA funding

For the coordinator, the MUIIME project has been the first MSCA project and also the first EU-funded research project. From her point of view, the main added value has been allowing the Fellow to restart her research career and get back into academia. Equally important has been the fact that the project has allowed the coordinator to mentor someone, and to share her extensive experience and knowledge.

For UCLan, which had only one previous MSCA project, the publications produced within this project also provide very important added value. The project is set to produce at least four good quality academic papers and a book proposal. This is very important for the Fellow, coordinator and UCLan. Furthermore, international research collaboration is the real added value stemming from MUIIME as the MSCA programme is believed to be built right for this.

The Fellow believes that the added value of MSCA has been the networking activities linked to the project. She has observed a significant increase in her reputation due to her participation in the project. For example, the coordinator and the Fellow were invited to Brussels to speak about the project, which brought them much publicity including online tweets. The Fellow now finds people emailing her and asking about MSCA as such. She has been appointed an external supervisor for a PhD student in Canada; in the past, she did not have the legitimacy to be a supervisor or mentor.

With regard to remuneration, the Fellow considers it to be very competitive, even in the context of the UK, and she has been very happy with the salary level. However, she has encountered an exchange rate issue, which can be very difficult in countries outside the Eurozone. This is something the Fellow did not think about at the beginning of the project. When she was asked at UCLan what currency she wanted to be paid in, she chose £ sterling (GBP) so as not to cause further administrative burden to the university. Following the Brexit development, the pound has fallen and this has become an issue for the Fellow. However, the university has reviewed her salary recently, taking into account the significant changes in the exchange rates.

²⁶⁵ The Research Excellence Framework (REF) is the new system for assessing the quality of research in UK higher education institutions. More information available at: <http://www.ref.ac.uk/>.

A4.2.2.3 Set-up and administration of the MSCA project

The research team (coordinator and Fellow) has been generally happy with the administration of the MUIMME project and with the MSCA administrative processes. No serious issues concerning the administrative burden have been observed. The coordinator has not been heavily involved in the administration of the project as it has been largely delegated to the Fellow. This delegation was possible and rational as the Fellow had already been a senior researcher before the start of the project. However, the coordinator has been consulted regularly and approved all the important decisions.

Therefore, it has been mostly the Fellow managing the project. She has prepared the budget and has taken care of all financial and managerial issues, with financial approvals done by the coordinator and the Head of School. UCLan's dedicated financial department has been seen as a great help for this project, as they prepared all the costings. The financial regulations allowed for undertaking networking activities, for which the team has been happy. The only question has been around travel costs, as sometimes the eligibility of the cost was problematic, especially when the Fellow needed to travel from her home university in Ireland.

Overall, the team considers the administrative burden linked to the MSCA programme to be very light. There are only two reports at the end of the project. The coordinator and the Fellow even volunteered for open access for which they prepared the data management plan.

It has been reported that the REA project officer for the MUIMME project has been very helpful: the Fellow could phone her anytime and receive a quick response. Furthermore, the communication with the Irish NCP, Mrs. Jennifer Brennan, has been regarded as excellent and the Fellow is grateful for her assistance.

A comparison with the NHS administrative burden has been made in this respect. The team had to overcome the NHS administrative requirements when asking for the on-site access at NHS facilities as part of the project. The NHS administration has been seen as much heavier than the MSCA project rules. The Fellow claimed that had she known about the difficulty with working with the NHS prior to applying for the project, she would probably not have applied. This was more complex also due to the devolution of the NHS administration across the UK, which meant that the research team had to ask for the approval repeatedly from various NHS Trusts.

A4.2.2.4 The delivery of the MSCA project

The MUIMME project explores cultural considerations around the use of donor human milk to feed vulnerable infants. This project is set in the context of the rapid expansion of donor human milk banks around the world, something directly linked to a global increase in premature births. Europe is taking a leadership role in the expansion of human milk banks, although issues associated with alcohol consumption and maternal donations are a concern for clinicians and health care staff, given the increasing problems associated with drinking among women of childbearing age. Europe has the highest alcohol per capita consumption rates in the world, making these issues particularly immediate.

The project has developed wide connections, including with some big names in the field. For example, the Fellow has been working for the four largest milk banks in the UK, including the former President of the European Milk Bank Association (EMBA). The data emerging from this MSCA project have been the most detailed on milk banking ever to be produced. The Fellow already has plans to write six papers and a book proposal.

The recruitment process has not been seen as burdensome at all. The only exception was the requirement to write a special ethics statement, as this has been subject to

the UK “tissue ethics” regulation. Going through this process proved to be very difficult. The coordinator had already known the Fellow before they decided to submit the proposal for this MSCA project, and she had worked with her on various occasions, which reassured her regarding the Fellow’s qualities and fitness for this MSCA project.

The Fellow had already been a very senior researcher when this project started, hence it was not necessary to provide her with new training in research skills. However, as part of the MSCA project, she was provided with opportunities to undertake high-quality NHS clinical practice training and similar activities, which helped her greatly in future work on the project – this was organised externally by the NHS. She also received diversity training: training designed to facilitate positive intergroup interaction, reduce prejudice and discrimination, and generally teach individuals who are different from others how to work together effectively. The Fellow is convinced this has been a very valuable experience.

Regarding difficulties in the project delivery, the team has not come across many. As mentioned above, there have been issues related to obtaining the approval by various NHS Trusts in the UK to do on-site work/research and also issues related to obtaining the tissue ethics approval.

A4.2.2.5 Impacts of the MSCA project

Although the project was ongoing at the point of research (officially until the end of March 2017), both researchers (the coordinator and the Fellow) consider the MUIMME project to be highly effective. The impacts are expected to materialise at various levels and the sections below describe some of the types of impact more closely.

Impacts at the organisational level

Impacts on research excellence

The project has produced high-quality publications and will generate even more research outputs after it has finished. There is a great emphasis on impact on real people in the real world and on real practice: in this case, it means parents and mothers and infants. There is a potentially significant positive impact on the coordinator’s unit at the Faculty of Health and Wellbeing at UCLan, particularly through the publications and the book. The university has a very applied focus and the project is believed to have highly innovative aspects. The coordinator feels that this project is an example of excellence in innovation.

From the coordinator’s point of view, the MUIMME project has helped her team to build a particularly strong area of research – breast feeding. UCLan did earlier research in this area but the participation in MSCA has made it much more intense.

Impacts on structured training and professional development programmes for researchers

This area of impacts has probably been less important on this project than on other MSCA projects due to the Fellow being already an experienced senior researcher when this project started. Therefore, it was not necessary to provide her with new professional development and training. On the other hand, the UCLan and the MSCA project allowed the Fellow to improve her teaching skills as she has been involved in teaching at UCLan, which has provided benefits to both the Fellow and UCLan, including students.

Impacts on international collaboration/networking/researcher mobility

The coordinator sees the networking activities and international cooperation as the real added value of this MSCA project. This area of impacts will probably materialise a little further down the line and after the project has completely finished. However, to give one concrete example, the coordinator is a convenor of a trans-disciplinary

annual conference. This particular conference has speakers from all over the world. This year Dr. Cassidy will be the keynote speaker. Another keynote speaker is a professor at Yale University and there will be other six global big names. Therefore, the Fellow will be speaking in very high-level company. All the conference proceedings will be published in an internationally-recognised nutrition journal. Besides this publication, the team have been receiving research papers from all over the world (Australia, Canada, Thailand etc.), which is largely attributable to the reputation of the MUIMME project.

The coordinator believes that the networking activities will be sustainable after the finish of the project. It is not always easily predictable what exactly will happen in the future but the team is very optimistic. They see future collaboration for example with Sciences Po. Paris and with Cardiff University. Recently, the coordinator applied for ERC Advanced Grants; although she did not get the funding, she sees a big positive contribution of the MSCA project there. In the ERC application, she had to include five examples of researchers/colleagues that she had collaborated with in the past and state where and in what area these people work at present. This is where MSCA is regarded as very helpful by the coordinator.

The coordinator has not yet taken anyone else from abroad since Dr. Cassidy (the Fellow) on her team. However, the Fellow cooperates with an undergraduate student (of Malaysian origin) who wants to work on milk banking and later wants to come to the UK to continue with her research.

The coordinator has good experience with EU research funding and therefore she would be interested in applying again in the future. Despite the Brexit development, she thinks EU research funding is in general very beneficial and she believes that it has been good experience. In fact, she is now preparing a proposal for a COST action, together with Turku University, Finland, and she would be happy to apply again for the MSCA funding when she sees the opportunity.

Impacts on business-academia collaboration/knowledge transfer

In the context of this project, the "industry" is health providers, i.e. the NHS in the UK. Given the applied focus on the health issues related to breast feeding and donor milk, this project is therefore totally grounded in industry. The publications from the MUIMME project will heavily impact on the NHS and the project will also have big policy applications set to affect the way milk banks operate across countries. The projects' outcomes have also contributed to the development of a mobile app on breast-feeding, which is due to launch soon.

Unexpected impacts at organisational level

The project is just about to finish so it is too early to talk about the whole spectrum of impacts, but the politics around milk banking are something that the research team did not expect to emerge. Getting through the tissue ethics committees and diverse health settings was a steep learning curve. However, this has been a strong experience for both the coordinator and the Fellow, and they expect to publish significant outputs around these issues. The whole political impact is expected to materialise together with policy agendas stemming around milk banking.

Impacts at Fellow/researcher level

Impacts on researchers' skills

To reiterate, the Fellow was already a senior researcher when the MUIMME project started, hence she already had the requisite research skills and so it was not necessary to provide her with new training in research skills. However, she has improved her teaching skills considerably. She is now in a position to teach midwives, offering practical aspects in addition to academic theory.

During the work on the project the Fellow has had many opportunities to work with senior researchers. She is very positive about the relationship with the coordinator, Professor Dykes, as it has been more like a partnership of two equal researchers than a mentor-learner relationship, and they have learnt a lot from each other. The coordinator is helping the Fellow to progress to soon become a reader or a professor herself. Besides that, the MSCA project has allowed the Fellow to meet a very large number of other senior scientists who are experts in their respective fields. This is unlikely to have happened without the opportunity that MSCA provided to the Fellow.

One of the most important things the Fellow has learnt by participating in the MSCA project are management skills. She has always had problems with not having enough time for various activities. However, only when running this project, she realised that the solution lies in effective time management.

Furthermore, the Fellow has also developed her big data and statistical skills. The online-based big data is a large quickly growing field and the Fellow recognises its importance for the areas of research that she works in. Thanks to the MSCA project, the Fellow feels she now has much more to offer as a researcher.

Impacts on researchers' careers

The MUIMME project is still ongoing and the Fellow is still working on it. Besides that, she is also involved in teaching at UCLan, on neo-natal nursing courses which are central to the area of milk banking. She has just recently become (together with the coordinator) part of an international breast milk association for which she has already done some online teaching, and she is now discussing potential future funding opportunities with them. The Fellow and the coordinator expect to publish many articles after the end of the project, as they have collected a considerable amount of data. They are now writing a paper about their experience of obtaining the ethical approval.

In thinking about her future, the Fellow has already begun to prepare an application for other EU funding, this time for the ERC; she acknowledges that Ireland has done very well with ERC funding so far. The Fellow's home institution in Ireland has received three ERC grants, yet all are led by male researchers. Besides the ERC application, the Fellow has several fellowship offers that she is currently considering. She did apply for a position in Scotland but the institution is very remote, hence she does not regret not getting funding in the end, and she is now looking for positions across Europe, including countries like France and Switzerland. The Fellow feels that had it not been for the MSCA funding she would not have been able to consider these international positions to such a large extent. The Fellow is now looking at many more opportunities, her horizons have widened and she is more confident in applying for further funding. Externally, she realises that participating in this MSCA project gives her a high level of legitimacy and recognition in the field. Just recently, the Fellow has applied for the Vincent Wright Chair at Sciences Po in Paris. If she is successful it would be exclusively because of MSCA and it would be very valuable for her area of research, as France has the most milk banks in Europe.

Despite not having any definite plans after the end of the MSCA project, the Fellow is very optimistic with regard to her future career and she feels that her experience with MSCA will help her to find a new job very quickly. Furthermore, it appears that wherever the Fellow ends up after the project has finished it will be always be beneficial both for UCLan and for the Fellow herself. The ideal outcome would be that UCLan can retain the Fellow as part of the coordinator's team by bringing in further funding. However, if that is not possible, the coordinator is very positive and believes that they will still be working on projects together. As stated above, they are still working on MUIMME, so it is perhaps too soon to speak about how exactly the MSCA project has impacted on the Fellow's future career.

Unexpected impacts at researcher level

The Brexit development has been one of the unexpected negative impacts at researcher level as the Fellow feels very unsure about her legal status in the UK.

On a more positive note, the Fellow did not expect to develop such a fruitful connection with North America. Through the MUIMME project, she met a researcher who organises a major conference on related topics in the US, in Carolina. This researcher now wants to bring this conference to Europe. This has happened thanks to MSCA. The Fellow also did not expect to become an external tutor of a PhD student in North America.

Furthermore, the Fellow believes that the MSCA funding has allowed her to make many more international connections than she had anticipated. Many of these connections are with people at the top of their fields, and they now know the Fellow's name thanks to the MUIMME project.

People are emailing the Fellow about how to start a milk bank and she has become very close with many of them. Mothers keep talking to her about the issues with expressing milk, breast feeding and donating milk; the Fellow has expanded a lot on these topics thanks to MSCA. Overall, the Fellow feels that the MSCA project has been the best thing she has done in her career.

A4.2.3 IF case study –ANOCAP

A4.2.3.1 Introduction to the MSCA project

Table 65. Overview of MSCA project – ANOCAP (IF)

Name of project	Comparative Evolutionary and Functional Genomics of Disease-Vector Anopheles Mosquitoes (ANOCAP)
Name/type of the coordinator	University of Geneva (Switzerland)
Name of Action	IF
Introduction to project	This is a genomics research project that focuses in the analysis of the DNA information of insects, in particular on the computational aspects of such analysis (e.g., algorithms to learn what is differences and common aspects between a bee and a mosquito). The main interest of the research fellow is the understanding of the biology of mosquitos in order to control them better. This research aims to take advantage of the genomics to better understand biology and have greater insight for the design of interventions and their responses (e.g. development of interventions that focus to a single kind of mosquito without impacting the health of other kind of insects). The project developed and employed computational strategies to interrogate multiple mosquito genomes for patterns of natural selection shaping the repertoire of functional genomic elements governing mosquito biology. The specific objectives can be summarised by three major goals over the course of the project: 1) conservation analysis to identify functional genomic elements; 2) divergence analysis to study gene and genome evolution; and 3) functional analysis to validate and characterise novel biological hypotheses.

Name of project	Comparative Evolutionary and Functional Genomics of Disease-Vector Anopheles Mosquitoes (ANOCAP)
Narrative on participating partners	<p>The University of Geneva Medical School was the sending institution. The fellow was a post-doctoral researcher of the department of Genetic Medicine and Development. Within this department, he was a member of the Computational Evolutionary Genomics group, which focuses on comparative analyses of genome sequences to understand principles of molecular evolution and approach the fundamental questions of the origin and evolution of biological complexity.</p> <p>The host institution was the Broad Institute of MIT (Massachusetts), and in particular, the Computer Science and Artificial Intelligence Lab. This group is part of a mission-driven initiative that brings together researchers in medicine, biology, chemistry, computation, engineering and mathematics across MIT, Harvard and Harvard-affiliated hospitals. It has built a consortium funded by the National Institutes of Health to speed discovery of ideas and spread data, methods and technology to the scientific community.</p>
Narrative on participating Fellows	<p>The fellow has a long trajectory in the study of the immune system of mosquitos. Already his PhD topic focused on the immune system of mosquitos. During his post doc, the fellow conducted analyses of the genome of other kinds of insects as part of his collaboration with other projects. Currently, his work focuses again on the genomic information of mosquitos.</p> <p>Today, the participating fellow is a professor at the University of Lausanne.</p>
Project budget (EUR)	EUR264 111
Start and finish date of project	January 2013 - December 2015

A4.2.3.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The research fellow regarded MSCA to be a perfect opportunity to demonstrate his ability to attract funding, because a MSCA project is both proposed and executed by the fellow independently. In proposals for other grants, the supervisor is the main researcher regardless of whether the post-PhD researcher contributed most of the work. In the opinion of the fellow, MSCA shows that researchers are able to attract funding independently, and he even declined employment offers that would allow him to conduct the same research, and chose to apply to the MSCA fellowship instead. In his words "I wanted to work in these projects and I had a couple of offers from labs in the states who would hire me to do it, but I really wanted the fellowship to do this research. Even my host department at MIT was willing to hire me even if I didn't get the MSCA grant, but I insisted on applying to MSCA".

Overall, the fellow chose to apply twice for MSCA funding, although with the same motivation. After his return, he went to an informative/preparatory course on proposal writing offered the National Contact Point in Switzerland, which was very useful and he wishes that he had that opportunity for his first application to the MSCA program.

Regarding the choice of the host institution, the fellow intended to work in a world-class lab for the kind of research that he is conducting. Moreover, private companies located near the campus collaborated with the university in this research field.

The added value of MSCA funding

In the opinion of the fellow, being able to show a MSCA grant in a CV is important. On the one hand, it indicates that you can secure funding independently, and on the other hand, the scientific community can also see that he can execute his own research plans. In his opinion, this is important because it differentiates a researcher who is just lucky to receive the right data and be assigned to the right project, from a researcher who can plan and execute his/her own research project.

The fellow further reported that he applied for other long-term international mobility grants for the same project, one from the Swiss National Science Foundation (SNSF) and the other from EMBO. He was awarded both grants on the same year that he got the MSCA funding, but none of the grants are compatible to the MSCA funding and the fellow had to decide therefore between the funds. The successful notifications from the SNSF and EMBO arrived first, but he postponed the acceptance of the two grants until receiving the confirmation of his MSCA application. In the view of the fellow, MSCA funding is more valuable because the duration of its funding is longer and the financial support is higher. According to the fellow, "the three years make a big difference. Two years in science is nothing. If you get a grant for two years, after the first month you should start thinking on your next grant. [...] In that case, you need to have the promise for your lab that when your funding is over they can employ you. MSCA, instead, provides more stability. Moreover, MSCA provides funds for overhead and a higher grant for your expenses."

A4.2.3.3 Set-up and administration of the MSCA project

The administrative aspects were overall manageable for the fellow. However, he noted that at the end of his project, he needed to write two very similar reports, the "end of phase two" report and the "end of project" report. Although this was not a problem for the interviewee because of the rich results of his project, it seemed redundant.

During his fellowship most administrative activities were carried out by the administration personnel of his host institution. Although administrative staff members of the lab were not familiar with MSCA actions, a few people within the institution had been responsible for MSCA administration before. The help between administration personnel from different departments helped to run all administrative issues very well.

The only issue encountered in his MSCA fellowship was a discussion of the intellectual property agreement between the sending and host institution prior to the start of his fellowship. This process was longer than expected and he was relieved that he did not plan to start his fellowship sooner as this might have provided complications.

A4.2.3.4 The delivery of the MSCA project

The fellow did not experience any difficulties during the proposal phase, although, at that time, the university in Geneva had not implemented structures to support participation in the program (which now exist). In consequence, he made contacts with the consortium and the research supervisor without any kind of institutional support or approval from the University of Geneva. There was also no formal recruitment process.

The fellow moved to the United States for three complete years, and collaborated with the genomic consortium established at the host institution. During his MSCA fellowship, he did not follow any formal courses. At the end of the fellowship, he registered for a French course offered by the university in preparation to his future employment which might involve teaching activities in French. However, he received

informal training to use the high-performance computer system of MIT, which was necessary for his research analysis.

In the view of the fellow, the budget of MSCA is higher than other long-term mobility programs. This is an important criterion as the cost of living in Cambridge (Massachusetts) is high.

Although the participant achieved the goals stated in his MSCA proposal, the achievement of scientific outcomes cannot always be ensured. Therefore, he wondered what would have happened if he would not have been able to deliver the expected results.

As a possible suggestion for improvement, the participant mentioned that the PR activities of MSCA could be increased, e.g. by actively raising awareness of scientific results using the media. Since this did not happen during his fellowship, the fellow proactively informed the MSCA administration of his accepted publications and suggested to write press releases on his research findings to inform the public of the achievement. The fellow suggests that the MSCA administration should invite fellows to provide a press release for each publication that is accepted. A couple of months ago, the MSCA administration took the initiative and contacted him in this regard for the first time.

A4.2.3.5 Impacts of the MSCA project

Impacts at Fellow/researcher level

Impacts on researchers' skills

The development of further technical skills was one of the most immediate effects of the project for the researcher. The fellow was instructed on the use of the high-performance computing system of the host institution, which was necessary for the computation of his research analyses.

However, according to the researcher, the most important skills that he developed during his fellowship was project management and coordination of a large number of researchers (120 approximately) e.g. for a publication. Although the researcher had previous experience in co-managing stages of projects, the MSCA project had a much larger scale and it was the first time he was responsible for the management of the project from start to end.

Impacts on researchers' careers

The fellow believes that his participation in the MSCA has been helpful to get his current academic position as a professor. Furthermore, he is confident that his MSCA fellowship will be important in his CV to secure future funding, as it is considered proof that the fellow is able to communicate ideas, design research plans, and execute projects successfully.

Furthermore, in the view of the fellow, the fact that the lab of the host institution is one of the most prestigious world-wide influenced his networking opportunities. During this fellowship, he received invitations to give talks as an invited speaker at conferences. In his opinion, being in the United States was also an important factor as it reduced the travel expenses to other high-level research institutes located in North America. Moreover, the members of the consortium also allowed him to present the projects of the consortium in several conferences, which provided visibility in the international research community. The fellow also got to know key people in the field, again, because of the geographical proximity of relevant research centres and groups. Due to the fellowship, the fellow could meet with a renowned scientist regularly in person.

Through his involvement in the consortium, the fellow became a person other scientists turn to when a certain kind of analysis needs to be conducted. Now, other scientists in the community know who he is.

A4.2.4 IF case study – Physics in Space

A4.2.4.1 Introduction to the MSCA project

Complete the following table by way of a summary.

Table 66. Overview of MSCA project

Name of project	Indirect Probes of New Physical Phenomena in Space
Name / type of the coordinator	Martti Raidal, Research professor at the National Institute of Chemical Physics and Biophysics (independent research institute in Estonia)
Name of Action	IF
Introduction to project	The ultimate goal of modern particle and astroparticle physics is to discover new physics beyond the standard model. Gravitation provides an infallible signal of new physics - the dark matter (DM). Cosmic rays (along with DM direct detection and collider experiments) can shed light on the non-gravitational nature of the DM. This project aimed to discover and explain Dark Matter.
Names / types of all other partners	There were no other official partners in the IF-grant framework. However partnerships were established with the Cambridge University's Institute of Astronomy and CERN in Switzerland.
Narrative on participating partners	The fellow Andi Hektor visited these institutions and received data from the experiments they ran. CERN had previously collaborated with the the National Institute of Chemical Physics and Biophysics; the partnership with Cambridge University was new.
Narrative on participating fellows	Andi Hektor, previously known through studies; former student from coordinator. Worked at CERN at the time.
Project budget (EUR)	EU funding amount: EUR148 582
Start and finish date of project	01-01-2015 – 31-12-2016

A4.2.4.2 Rationale and added value of the MSCA project

- The National Institute of Chemical Physics and Biophysics in Estonia (KBFI) is an interdisciplinary research institute, which carries out basic and applied research in materials science, genetic engineering and biotechnology, environmental technology, in the field of particle physics and informatics. The National Institute is an important science body in Estonia but also in a wider, international context it is known for conducting high quality scientific research.

As such it is always interested in attracting promising researchers especially in fields, such as fundamental physics, where demand is high and supply of good researchers is low.

- In answering the question on why the coordinator decided to coordinate a MSCA project a significant contextual factor emerged. In Estonia, almost all researchers, except when they are on a fixed contract with a university, have to make a living exclusively of grants. This is a deliberate policy instrument by the government, to not provide subsidies and make the field of scientists extremely competitive. Hence there is a large incentive to apply for any existing grants, including the one provided through MSCA.
- The coordinator knew the fellow, Andi Hektor, because he taught him before and listed him as his prime reason to organise the MSCA project; to attract this specific scholar back to Estonia from CERN in Switzerland where he was working at that time. Both the coordinator and fellow were active in the same subdomain of physics: indirect search for dark matter. In addition, the coordinator had previously received an IF MSCA grant himself in 2001/2002 and as such knew the programme well and advised the fellow to also apply for this grant.
- The project on discovering and explaining dark matter had been running some time before the MSCA grant had been awarded, mainly through national grants. The coordinator indicated that he also had applied to several other grants, alongside the application to MSCA. The advantage of a MSCA grant over any national grants is that it provides sufficient funds for several activities: visiting other institutions, traveling. Additionally, in Estonia, the salary is competitive.
- What was repeated throughout the interview by the coordinator is the 'braindrain effect' MSCA can have on talented scholars from 'research-low' countries. In that sense the specific aspect of this IF being a 'return' grant was particularly interesting for both the coordinator and the fellow. It allowed the fellow to reintegrate into a EU-13 country through a MSCA grant and work on a project through which he later could obtain a national grant and sustain his career in Estonia. In that sense, the added value of the MSCA grant in this particular case was not so much the project itself, which would have continued with other grants, but the return of the fellow from Switzerland to Estonia.
- The fellow himself underlined the above outlined reasons. He wanted to return to Estonia both for personal reasons (family, friends) but also for scientific reasons. The National Institute has good contacts with CERN and so it was easy to maintain relations with the institute in Geneva. Even though CERN is the leading institution in particle physics there was no opportunity for him there to get a permanent position since Estonia is not yet a full member of CERN. Hence it was important to him, career wise, to transition to another institution where there were more opportunities to grow. In addition the topic fitted his own research well; the laboratory at the National Institute was new and there was an overall good research infrastructure.
- The fellow mentioned that there were similar grants available in Switzerland that allow Eastern European researchers to return to their home countries. However the fellow could not apply to this as it was only open to researchers at universities and not at institutions like CERN. Compared to national, Estonian grants the MSCA grant allows for more travel and mobility and offers a good competitive salary.

A4.2.4.3 Set-up and administration the MSCA project

The coordinator was satisfied with the administrative burden of the project associated with participating in this particular MSCA project. There had been no excesses or problems and it did not in any way influence the project. Even when specifically prompted on what could be improved the coordinator could not think of anything that should be run more smoothly in terms of the process. Most administrative actions were organised through the participant portal which he characterised as 'straightforward'.

The coordinator had managed all sorts of grants and found the MSCA rules to be simple and clear and therefore did not experience any 'burden' related to the administration of the project. One thing he would mention is that there were some 'bugs' in the online portal, but he was quick to add that this was more an ICT- issue than a procedural obstruction. When he applied for a fellowship himself he also did not experience a significant administrative burden.

The fellow was overall quite satisfied with the administrative burden of the project. Especially once the project had taken off, the fellow's experience was closely aligned to that of the coordinator: a low administrative burden especially since their grant was below the threshold of an audit. The fellow was also quite satisfied with the application process, however he felt that the administrative part (vis-à-vis the research part) could be more concise. For instance, specifying a timetable is not always realistic for a two-year project in a field that evolves as much as his. He felt that the structure of this part should be shorter, simpler and more flexible.

A4.2.4.4 The delivery of the MSCA project

The research topic or goal of this project is located in a very active field of science; to discover what dark matter is and how it works. There are many experiments going on in this area and it is deemed one of the most important questions in the current field of physics. The project analysed data that mainly came from external research facilities such as CERN in Switzerland and the department of Astronomy in Cambridge. The latter partnership was established by the fellow during the MSCA project, previous contacts had already been in place with CERN in Switzerland and some other partners in Finland. Although the research project did not discover its goal of finding dark matter – which was quite unrealistic the team discovered new knowledge and made a few steps ahead in their research. This also resulted in a number of co-authored papers by the coordinator and the fellow and some presentations at conferences.

The budget, according to the coordinator, was not exceeded and was well-suited to the project. As mentioned before, the salary was good according to Estonian standards, and there were sufficient funds to travel and visit other institutions with whom they had to cooperate. The coordinator adds that for such a theoretical project the needs are also rather limited: office space; computers; salaries and travel expenses. He cannot speak for any larger, more resource intensive projects. However for this particular MSCA project the budget was sufficient and was not overrun.

There were no specific courses set up for the development of the fellow regarding professional development. Again, it appears that the Estonian context matters when trying to assess the added value in this regard of the MSCA grant. Due to the competitiveness of the Estonian scientific research system the coordinator listed trainings or regular talks about career development as part of his 'normal' job. As such he also had these talks or small trainings with the fellow, but this was not exclusive or limited to MSCA. The coordinator mainly tried to support the fellow in attaining a national grant after the MSCA grant had ended to continue the project in Estonia.

The fellow instead used the budget for development or training by attending conferences and inviting special visitors to spend one week in Tallinn to access more

information or start/intensify a collaboration. The latter was something that without the MSCA grant would have been far less likely to occur since high-profile researchers are reluctant to travel, especially to a less-well connected city like Tallin. Those contacts also are very valuable within the field of physics and are sustained over time. In addition the fellow attended special courses on scientific writing organised by the University of Tallinn. This was organised at the fellow's request, something also made possible due to the pre-existing links between the University of Tallinn.

The coordinator nor the fellow could not think of any problems or difficulties the project ran into. The budget was sufficient and due to the amounts of funding requested being below a certain threshold there was no audit and accompanied hassle. The roles were simple and the overall project management was very straightforward within such a small project.

A4.2.4.5 Impacts of the MSCA project

The coordinator stresses that the impacts of a single 2-year post-doc salary are limited; yet overall he argues it has had a good influence on his organisation and the research they carried out but no decisive effect on either.

Impacts at the organisational level

The main impact at the organisational level was the attraction of more colleagues to the same project, gaining more research mass to achieve scientific results. Other post-docs and PhD students became interested in the research on dark matter and joined the project or assisted the researchers in part of their work. However, in terms of changes in hiring procedures, trainings or course development or direct changes in research directions, this MSCA project had little impact on the organisation as a whole. Many of the researchers at the organisation are familiar with the opportunities MSCA and other ERC grants due to the structure of the Estonian research system.

Impacts on research excellence

The main impact within the realm of research excellence is that the fellow, within the National Institute, continues to work on the same project through a national grant. The coordinator was actively part in ensuring this grant and also hopes to continue the contacts established with other institutions like CERN and Cambridge during the MSCA project. He underlines the need in physics to work internationally as experiments are expensive and time consuming; hence sharing of data and results is essential to keep track of the field. In that way the MSCA added to the network of the coordinator and the National Institute as a whole by facilitating more travel and visits to establish partnerships. However, the project did not create an entirely new area of research in which the organisation was not yet active. Instead the MSCA further extended and consolidated research in the area of dark matter previously commenced by the National Institute.

Impacts on structured training and professional development programmes for researchers

The work and transfer of knowledge took place 'on the job' according to the coordinator. There were no specific courses or trainings organised by the National Institute for this particular MSCA project. However, other courses on career development and on the topic of the project were organised as part of the National Institute's standard programme. In that sense the impact of the MSCA in the regard of structured training and professional development programmes was very limited in this case.

Impacts on international collaboration / networking / researcher mobility

Both due to the set-up of the Estonian research system (largely based on scientists acquiring their own grants) and the nature of the field of physics in which, according to the coordinator, collaboration is key, the National Institute already collaborated nationally and internationally. Within this project it was essential to gain access to raw data and research results to further analyse those, instead of running those experiments in Estonia, for which the National Institute has neither funding nor infrastructure.

From that perspective, MSCA project extended and build further upon the tradition of international networking and collaboration. The funds for traveling and visits to other institutions were obviously very helpful in practical terms, but the fellow in this instance also relied largely on his own network and contactpoints in establishing the actual partnerships. As mentioned before, the partnership with the Cambridge department of Astrology was established within the MSCA project, at the initiative of the fellow and this is continued within the new project funded through a national research grant. The coordinator also applied for several other ERC grants Horizon2020 projects, but did not win any so far.

In terms of researcher mobility, the coordinator emphasised the loss of talented scientists in Estonia the importance of this fellow receiving the opportunity to return to Estonia with good prospects and a job-guarantee of at least two years. The researcher mobility driven by MSCA goes both ways; it adds to the brain drain, but can also reverse this trend like in this instance. The coordinator stressed how more of these 'return' grants should be awarded to ensure that less research-intensive countries can also develop their research infrastructures and human capital.

Impacts on business-academia collaboration / knowledge transfer

There were no official collaborations with business. This was explained by the fellow as being partly due to the fact that the research they conduct is very fundamental so the applications to the business sector are very limited. On the other hand he had contact with a few electronics companies because he needs very specialised equipment to conduct experiments. It did not lead to any thorough collaborations, however there were some presentations held by small companies on the products they are developing and through the fellow they were put in touch with colleagues at CERN.

Unexpected impacts at organisational level

There were no unintended impacts at the organisational level according to the coordinator as the MSCA project fit within an existing field and was part of a culture of applying to (international) grants and within a field that necessitates international collaboration.

Maybe that it helped this grant helped this one guy to come back; return; big brain drain in Estonia; how all EU money is designed for brain drain; smart people from poor countries; there is a mobility; is part of the rules; obvious trend is to move from here to Oxford; nobody from Oxford wants to move here; if part of the evaluation is the place; and the evaluators are from west-european and they give non-west European a bad grade; how this pool of experts has been collected and the way it works; if part of the rule is mobility; instead of evaluating the applicant and the professor; but they evaluate the institutions; if it's a small university they are gonna lose.

Impacts at the fellow / researcher level

Impacts on researchers' skills

The networking the MSCA grant allowed for was identified as a very important skill the researcher further developed. He agreed with the coordinator that the nature of

fundamental physics depends on a collection of different kinds of data from different experiments. It is crucial to combine those, and thus with this type of project you are forced to look for new contacts. The MSCA provides a certain status that facilitates this type of contact. The fellow mentioned this as a large advantage of the MSCA scholar 'stamp': the type of access it allows into institutions that without a similar introduction would not be as willing or eager to forge a partnership.

Impacts on researchers' careers

The same mark of the MSCA status was also relevant at the national level for the fellow. Since there are not many MSCA fellows in Estonia he drew the attention of the national agency which funds research where he not only received a research grant from, but who also invited him to present on 'how to apply to European grants'. He mentioned that acquiring the status of a MSCA scholar also boosted his confidence in applying for several other grants and that he also believes that it furthers his chances.

Unexpected impacts at researcher level

The researcher mentioned that he did not experience any personal unexpected impacts but that his 'story' seemed to have encouraged more Estonian researchers to apply for a MSCA grant. Similarly at the National Institute, Italian colleagues had also started to look into the possibilities of applying for a return grant through MSCA.

A4.2.4.6 References

Publications

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Interviews

Prof. Martti Raidal	06-03-2017
Dr. Andi Hektor	08-03-2017

A4.3 ITN case studies

A4.3.1 ITN case study – MICACT

A4.3.1.1 Introduction to the MSCA project

Table 67. Overview of MSCA project – MICACT (ITN)

Name of project	MICACT
Name / type of the coordinator	Tartu University, Estonia
Name of Action	ITN
Introduction to project	The main objective of the project is the improvement of the

Name of project	MICA CT
	career perspectives (in academia and in industry) of young researchers by training them at the forefront of research in the field of smart soft systems made of Electro-Active Polymer (EAP) microactuators for advanced miniaturized devices. The overall objective for the scientific programme is research and development of EAP materials and their integration for industrial applications.
Names / types of all other partners	<p>Estrotech Ou, company, Estonia</p> <p>IVTech SRL, Spin-off Company from university of PISA. Italy.</p> <p>Arquimea Ingeniera S.L, company. Spain.</p> <p>The National Center for Scientific Research, research organisation. France.</p> <p>The Polytechnic University of Cartagena, Spain.</p> <p>University of Paris Diderot, France.</p> <p>Technische Universität Darmstadt, university, Germany.</p> <p>Cergy-Pontoise University, France.</p> <p>Delft University of Technology, Netherlands.</p> <p>Linköping University, Sweden.</p> <p>Queen Mary University of London, UK.</p>
Narrative on participating partners	<p>The Universities are focused on either material science or engineering.</p> <p>The companies vary in size, many of them are small or medium sized firms. They are developing products or offer consultancy services.</p> <p>Approximately half of the partners have worked together before in a strong network.</p>
Narrative on participating fellows	PhD students, all are employed either in a company or at a University.
Project budget (EUR)	EUR3.3 million ²⁶⁶
Start and finish date of project	1 January 2015– 1 January 2018

A4.3.1.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The objective for the Microactuators (MICA CT) project is twofold. The main objective of the ITN project MICA CT is to improve the career perspectives of young researchers, both in academia and in industry, by training them at the leading edge of research in

²⁶⁶ http://cordis.europa.eu/project/rcn/193854_en.html

the field of smart soft systems made of EAP microactuators for advanced miniaturised devices. Thereby, the project hopes to ensure the leading role of European researchers in the field as well as helping them transition into industrial positions.

The scientific goal of this European Innovative Training Network (ITN) is to conduct research on and development of Electroactive Polymers (EAP) and their industrial applications. EAP materials are so called *smart materials*, characterised by the capability of changing dimensions and/or shape as a result of electrical stimuli. The materials enable a broad range of applications for which large strains and forces are desirable, and for which built in intelligence is necessary. For example, one of the partners is a company focused on advanced in-vitro models.

The project partners had worked together in unofficial arrangements on beforehand, and knew each other well. The coordinating partner, Tartu University (Estonia), saw the project as a way to fund an official collaboration. Tartu University also perceived the project as an opportunity to gain international visibility as the MSCA funding would bring prestige to the university. This would also help the university to attain desirable business connections. The Polytechnic University of Cartagena (Spain), and Linköping University (Sweden) further points out the synergy effects of working together and combining resources in the project. The partners have had similar ideas, common projects and complementary materials; some provide the physical models and some the chemical models. This enabled the project to start producing important research from day one.

Furthermore, motivations from the university partners was the funding of PhD positions, fuelled by the importance of equipping new researchers with skill and knowledge in the field of soft smart materials, along with the international group.

Additionally, the Polytechnic University of Cartagena highlights benefits on the organisational level. With regards to macro-economic circumstances surrounding the Spanish university, the generous funding was of utmost importance for the university in order for them to be able to educate PhD students as well as develop products.

The university partners also mention that the project would provide them with possibility to proceed and develop their own research.

The interviewed business partner's (IVTech) participation was motivated to by the possibility to use the research on new materials in order to develop technologies and products in the in-vitro field. In particular, IVTech had ambitions to realise actuator membranes.

If the project had not come together, the degree to which the individual partners would be able to pursue with national funding varies among university partners. True for all is that the national funding would not have brought the same internationalising effects. Furthermore, for the Polytechnic University of Cartagena, the MSCA funding was absolutely essential. None of the elements would have proceeded without it, due to the macro-economic situation in Spain and lack of national funding. At the University of Linköping, several parts of the project could have gone ahead with national funds. However, that source of funding would exclude the possibility of taking on incoming students.

According to IVTech, some of the technological advancements would have gone ahead anyway, but the research would have been more time consuming. Obstacles that would have to be solved would have been to find a fellow and provide this fellow with a teaching network.

Three partners are not active at the moment, but this has not been troublesome for the network, rather the situation was anticipated by the coordinating partner. The coordinator argues that the life of a professor can change easily, they have a tendency

to move around and find other interests, as well as the fellows. This is argued to not have affected the delivery of the project.

According to the partners, the budget was sufficient for the needs of the organisations, especially when it comes to student activities. All these activities were well covered by the budget. However, some costs relating to managing (travel expenses for example) were not completely covered. This only had consequences for the individual in question, because funds from other projects had to be used.

The fellows within the project applied to for the project to get a PhD education, this was the main motivation. Additionally, the research topic was interesting and in line with what they had studied before. To go abroad and do a fellowship was not the main motivation, but it was a positive element of the programme.

The added value of MSCA funding

At heart of the added values mentioned by university partners are the synergy effects of working along with an international network. The form of the collaboration, which is specific for the MSCA funding, is that it enables a generously funded, large network during an extended period of time. This implies increased possibility to share contacts, to share experiments and discuss results.

The prestige of the MSCA funding is also an added value according to university partners, in comparison to other funding schemes. MSCA provides a quality mark which will facilitate funding of future projects as well as it will bring international visibility and acknowledgement.

Other programmes do not lend themselves to this kind of partnership, rather they entail more temporary collaborations with fewer partners involved. These other funding alternatives were other EU alternatives, such as Erasmus or the Individual Fellowships (IF) action of MSCA. National funding would maybe keep some partners' research ongoing, but it would not be enough to teach PhD students or enable the network. The mobility factor in the programme is also considered an important aspect, the exchange between many countries and many students gives a rather unique opportunity to create a professional network early in the career.

For IVTech as a business, the added value is the new knowledge, but also the connection to the European level of research in the field and to be involved in the creation of new scientists. This would be hard for the business to achieve without the MSCA funding, due to the lack of infrastructure for hiring of a fellow as well as providing that fellow with a teaching network and the required facilities.

For the fellows, the added value is on the one hand the prestige of the MSCA funding. To have obtained their PhD training through a MSCA project, will be appreciated by future employers, compared to other programmes. Another fellow mentioned that the added value was the international network and the structured training, which was both generous and extensive compared to what other PhD positions entail.

A4.3.1.3 Set-up and administration of the MSCA project

The process of creating a network of partners was mainly the job of the coordinating university, Tartu University. According to the coordinator, the process to create a network was easy in the sense that many of the partners already had worked together since many years. The process was more troublesome when it came to attract new partners. Several potential partners thought the project to be a bit too ambitious. It was also somewhat difficult to attract businesses to the project, and all of the businesses that ended up as partners were already connected to universities.

The coordinator suggested that the partners who decided to participate in project considered the MSCA to be an attractive source of funding because of the prestige and

acknowledgement it provides. Some of the universities in the project are struggling to attract PhD students, and the MSCA programme brings an attractiveness as well as generous funding and international connections. The set up and application for the project is not considered to be something out of the ordinary, and the post-approval administration is not considered troublesome except for a few misunderstandings with the programme officers. According to the coordinator, the effort regarding the set-up and administration fall under the normal expectations for this kind of project.

IVTech have not encountered administrative burdens out of the ordinary, neither did any of the other interviewed university partners.

Regarding other burdens or complications on practical issues, the coordinating partner, university partners and the business partner had some experienced some problems relating to salary levels. The European Commission are very strict on the requirement that salaries would be held at the same level across the participating countries. However, it was brought up in the interviews that it would be better if the salary was adapted to the local situation. As it is now, PhD students within the MICACT project earn as much as twice the amount of a regular PhD students in some of the countries. This has the potential to create something of a 'social problem'.

A4.3.1.4 The delivery of the MSCA project

The project is a network of partners that do research in collaboration through training PhD students in the field of soft smart materials. Students from all over the world apply for positions at the different partner universities or businesses, in the various countries where these are situated. Accepted students come from slightly different fields, and they may be faced with unfamiliar techniques and knowledge, but they are provided with good support from supervisors and teachers.

The PhD students obtain training in the host-university or company, as well as from the *training schools*. The partners take turns arranging the training schools, which are themed training days. The aim of the training schools is to create a deepening of knowledge in the field of the project, as well as broadening of knowledge across similar and connecting fields. The format is a few days of intensive, themed training, where the students get to train their technological skill and competence through working with the machines and the materials, going to lectures as well as attending seminars and group discussions. There is also a focus on equipping the students with soft skills, such as presenting and writing papers. Business related information on patents and commercialisation of products are also provided the students. The training schools are managed internally by the partners, but it is part of the format to bring in guest speakers in order to give a broad picture of the field and the theme in particular.

The interviewed PhD student employed by IVTech got additional training in the business environment as it provided both scientific/technological industry specific skills as well as purely business related training such as realising business plans.

Funding also covered international conferences the PhD students wished to attend.

The PhD training offered within the MICACT project provides several types of added value for the students. The interviewed PhD students indicated that the training schools and other activities were well-funded and qualitative. The knowledge they provide is much deeper and broader than they could have got access to through other programmes. The combination of deep and broad knowledge, which is specific for the training schools and the project, is important according to the students as it provides the overview and at the same time allows for practice of very specific skills. Additionally, the training in soft skills is highlighted as particularly extensive and valuable according to the interviewed PhD students.

The university partners identify that the international network which the students get access to is also an added value. It is a rare opportunity to access an extensive international network so early in one's career, and it will be beneficial for their future.

An interviewed PhD student further implied that the access to forefront facilities such as training in cleanrooms, at a much earlier point than would have been possible with other training programmes, will provide the student with important skills for both company and university careers.

The move abroad was also mentioned by the interviewed students as an important part of the programme. For a young researcher, to live in a new country brings added value in itself, due to the positive effect it has on personal development.

The recruitment process was perceived as open and transparent from the perspective of the fellows. The partners ensured this through a well-funded marketing of the positions on various web pages. Fellows sent in their applications, along with recommendations from previous supervisors etc. After further interviewing, the selection of students was completed. The fellows had found it to be very valuable that various people involved in the project were happy to help with practical issues such as accommodation, translations etc. From the point of view of the partners, there were some irregularities in the successfulness of attracting students. The German and French universities had difficulties to attract the right amount of applicants. This was solved through internal sharing of the applicants among the countries, and it did not affect the delivery of the project.

A4.3.1.5 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

Turning to impacts on research excellence, it should be noted that there are some differences on the organisations depending on the type of partner (university or business) as well as the macro-economic situation of the country where the organisation is situated, and the level to which the individual partners are able to fund research on their own.

Universities situated in countries with less resources on a national scale, such as the Polytechnic University of Cartagena, tend to struggle to fund PhD positions with national means, and without the MSCA, the PhD position would be vacant. The project has so far had a considerable impact through improving the status of the research area within the organisation.

For Tartu University, the impact on their ability to conduct high quality research relates to the increased credibility and visibility due to the network of partners, to have the whole network to show results from. This provides credibility and facilitates the process of getting new projects and establishing other collaborations. These impacts are described by the university partner as being knowledge brokering effects in the university and in the country as a whole.

For Linköping University, the impact on research excellence was the additional quality stamp provided by the high quality research conducted within the project, and the visibility the MSCA funding brings.

The area of research, soft smart materials, was not new to any of the partners. The coordinator commented that to get the MSCA funding, you need a lot of previous experience in that field. However, the funding has given the partners in the project the possibility to explore new areas of this field. For the interviewed business partner, the area is not exactly in line with what they normally do, but this is not a problem,

because there is lot of research that is potentially important for their field because the business activities go across different fields and disciplines.

The fellows are still in training and there are no publications at the moment. The goal is that they will write their PhD theses. Linköping University adds that it is still very early to talk about impacts relating to patents or IPR, but several partners have got some ideas and inspirations from the project with which they will continue. Businesses got a good knowledge base which they can use when developing products.

Impacts on structured training and professional development programmes for researchers

Tartu University is the only interviewed university which will continue some courses after the end of the project. Other universities would like to continue the format of the training schools as they have been very successful, but it would be too costly to run these using internal resources. Tartu University also identifies the impact of the project in terms of facilitating the recruitment of new students.

The business partner, IVTech, would like to continue some of the teaching elements in the future. The project is a good way to increase teaching part of the company, and the structure will hopefully make it easier to increase the amount of teaching in the company in the future.

Impacts on international collaboration / networking / researcher mobility

The university partners all identify that the project has brought visibility and that they have made some new connections. Although many of the partners knew each other beforehand, the project still enabled different international constellations.

The Polytechnic University of Cartagena identifies impact from the project on the interest of MSCA funding within the organisation. Now, more research groups are interested in mobility programmes and MSCA funding. Further, the university has got in contact with several research groups outside of the project. Research groups from Mexico and Japan have visited the university.

To the Italian business partner IVTech, international contacts are standard in this field and for their activities, and this was not a result of MSCA funding. However, the company has been very satisfied with the MSCA experience and has already submitted a new proposal for another MSCA programme.

Linköping University identifies additional internationalisation effects of the MSCA. This comes from the quality mark and visibility the MSCA provides, which facilitates recruitment of new researchers.

Impacts on business-academia collaboration / knowledge transfer

Linköping University have had a lot of engagement with business actors prior to the project. However, it is beneficial and important that the MSCA funding is open for small and medium sized firms as well, because these do not always have capabilities to do their own research. This is an added value of the MSCA that it opens up for dialogue with these companies.

The Polytechnic University of Cartagena has had a lot of contact with the industry during the project. They do identify an issue with the fact that businesses may want to have results in the short term. This is a bit problematic as the university is very busy with teaching and does not have enough time to develop the requested results. Tartu University has been able to make business more interested in their research thanks to the combined project results from different partners.

From the perspective of IVTech, the project is important because they have got in contact with the universities and been given access to the scientific base and analysis.

They can use this material in order to evaluate the possibility of producing products themselves. To get in house knowledge through a PhD student is also important.

The project is still very young, and has not generated any patents. Tartu University argues that they leave patents for the companies. Linköping University adds that a lot of different IPRs are developed through the creation of new materials and other scientific outputs, but that the commercial value is not big enough to be able to file a patent just yet.

Unexpected impacts at organisational level

Linköping University see a great value of the network in terms having strengthening effects of a European identity, at least for the participating students and partners. Students are able to see other cultures and experience a borderless Europe. This creates friendships and gives a great example on Europe's ability to cooperate. This was perhaps not surprising, but the work in the projects illustrated this in a very nice way that the university had not anticipated.

The Polytechnic University of Cartagena had not anticipated the boost that the project provided for the research field. As an effect of the network and project activities, there is now a much larger interest in the field.

Impacts at the fellow / researcher level

Impacts on researchers' skills

The interviewed PhD students reported that they have so far received a broadened knowledge in the field of soft smart materials. They have done their previous studies in fields close, but not completely in line with the project, meaning that they have encountered some unfamiliar techniques and knowledge. They suggested that it has been very beneficial for them to broaden their knowledge. New knowledge within bioengineering was something they thought of as particularly useful for their future careers. The students may not have encountered these fields had it not been for the MSCA project. The interviewed students also mentioned that the organisation from university/companies had provided good support when they met areas they were not completely familiar with.

One of the interviewed students is situated at IVTech, focused on in-vitro models, and there, she has become familiar with the company specific advanced in-vitro models. The most valuable skill that this fellow has obtained so far is knowledge of design and prototyping, which she had got to learn from the company. This is a good example of the value of having business partners within the project. The interviewed student has also gained some experience with business related issues, such as company strategies.

The interviewees mentioned the added value of the MICACT project particularly for the development of soft skills. The format of intense training schools with presentations, paper writing, working with new people, has been beneficial and well needed for the interviewed PhD students. One of the students particularly praised these activities. The student in question had previously struggled with presentations in front of groups of people, as well as initiating contact with new people. The project and the format of the training schools had helped with the development of these skills. To work in a somewhat familiar network of MICACT students, combined with meeting and working with completely new professionals and learn new skills, creates a balance of familiarity and challenging elements. In the view of the interviewee, other PhD students at the university did not have the same amount of meetings, deadlines and presentations. Therefore, the generous training possibilities offered by the MSCA, in comparison to other PhD programmes, is an added value the students would not obtained had it not been for the MSCA.

The students have so far had a lot of interaction with new and important professionals due to the breadth of the project. One of the interviewed students particularly pointed out the valuable experience of working along with engineers in the cleanroom.

Both interviewed students also has received an opportunity to start to learn the language of their host country.

Impacts on researchers' careers

The interviewed students are still enrolled in the project were they obtained PhD training. However, up to this point, the project has been significant for how they perceive their future career.

The experience of leaving their home country and going abroad has been beneficial on a personal level, increasing the students' independence.

The interviewed students also consider the programme to be perceived as something positive in the eyes of a future employer, due to the specific prestige that is connected to the MSCA funding.

The techniques and skills that the students have obtained during the programme are considered by themselves to be highly valuable for the future career. The MICACT project has provided opportunities to learn these skills in a more extensive manner than comparable PhD programmes.

Unexpected impacts at researcher level

The PhD students did not really know what to expect when they signed up for the programme, so much impact is indeed unexpected. Not any negative impact has been mentioned, only positive. To acquire knowledge outside of the students' usual fields of studies has been a bit unexpected as they at the outset did not know all of the details around what work they would be doing. As the MICACT is supposed to give an overview of the field, to expose fellows to some new fields are part of the programme, and the fellows feel that this new expertise will help them a lot in their future careers.

A4.3.2 ITN case study – Minilubes

A4.3.2.1 Introduction to the MSCA project

Table 68. Overview of MSCA project – Minilubes (ITN)

Name of project	
Minilubes (ITN)	
Name / type of the coordinator	AC2T research GmbH (business) (Austria)
Name of Action	ITN – FP7-PEOPLE-2007-1-1-ITN
Introduction to project	The Marie Curie Initial Training Network “Minilubes” was initiated as a highly interdisciplinary research group aimed to embrace the complex challenges posed by using ionic liquid as lubricants. The overall Minilubes objective was to provide the fundament in Europe for the education and employment of young researchers starting their career in a large and cross-disciplinary research group composed of academia, private research institutions and industry. The scientific objectives were defined to provide the knowledge for the implementation of ionic liquids as high performance lubricants (CORDIS project summary).
Names / types of all other partners	<ul style="list-style-type: none"> ▪ Uniwersytet Gdanski (University) (Poland) ▪ Universidad de Vigo (University) (Spain) ▪ Martin-Luther-Universitaet Halle Witten berg (University) (Germany) ▪ Univerza v Ljubljani (University) (Slovenia) ▪ Cardif University (University) (United Kingdom) ▪ Fundacion Tekniker) (Fondation-non-profit) (Spain) ▪ Institutul de Chimie Macromoleculara "Petru Poni" (Public Research Organisation) (Romania) ▪ Centre National de la Recherche Scientifique (laboratoire de mathématiques Blaise Pascal) (Public Research Organisation) (France) ▪ GKN Sintermetals SPA (business) (Italy)
Narrative on participating partners	ACT is a private research centre focused on tribology with 160 employees (around one fourth on lubricants and lubrication). One objective of ACT, apart from producing knowledge on tribology and stimulating research, is to participate in specific education and training of R&D staff in the field of tribology. Several public research labs participated in the project. Originally, two companies were interested in being part of the project but only one eventually joined the consortium, GKN Sintermetals which employs 6,000 associates worldwide (30 facilities). Some partners of the project (ACT, Tekniker and the University of Ljubljana) have previous experience in cooperating with each other.

Name of project	Minilubes (ITN)
Narrative on participating fellows	The network delivered research training for 11 early stage researchers and for six experienced researchers.
Project budget (EUR)	<ul style="list-style-type: none"> ▪ EU funding amount: EUR2.7 million • Any other funding: EUR0 million ▪ Total project budget: EUR2.7 million
Start and finish date of project	October 2008 – September 2012

A4.3.2.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The rationale of the project was twofold: participants explained that a research programme on ionic liquids as high performance lubricants was missing, so was a research community in Europe on that topic.

The project was an opportunity to start from the fundamental research carried out so far on ionic liquids and to develop a large number of industrial applications. The coordinator indicated that a comprehensive project was set up with the aim to assess the environmental properties and economic aspects of ionic liquids.

The coordinator who belongs to a research company gave a specific focus on the possible industrial applications and commercialisation of the research outcomes of the project. The original idea was to include industrial companies in the project to ensure knowledge transfers and the development of industrial applications during the course of the project. Two companies were approached to be part of the consortium but only one company participated in the project.

The coordinator (ACT) previously worked with two partners (Tekniker and the University of Ljubljana) on a feasibility study. After this study, they all decided to launch a larger project, resulting in Minilubes.

The MSCA project was perceived as an opportunity to gather different types of expertise on the topic of the project: simulation, tribology, and fundamental research. The researchers who applied for a fellowship explained that the project offered them an opportunity to work on lubricants from different perspectives. All of them acknowledged the large spectrum of the project which was considered as very positive.

The main motivations for the organisations that were interviewed was to benefit from EC funding for research projects and for the recruitment of PhD students.

The added value of MSCA funding

All interviewees underlined that the project was a chance for them to work in a pan-European project. None of them could have been involved in a project with organisations from so many countries.

According to the organisations we had interviews with, without the funding, the researchers would not have been recruited.

The representative of the University of Gdansk reported that when the project was designed (back in 2007-2008), Poland had been an EU Member State for few years and the Polish actors were very keen on participating in international projects which

was incredibly difficult in the past. For this actor, Minilubes was unique from this perspective.

At the time they applied, the participants had been involved in international collaborations. However, most of the time, cooperation was limited to few countries and/or to neighbouring countries. For the partners, Minilubes was explicitly perceived as a means to enhance their international research network to countries with which they had few contacts or no contacts at all.

The consortium was built around a few partners which knew each other already. Minilubes was an occasion to transform personal relationships (e.g. people who met in conference) into an institutional cooperation.

Other potential partners that were added in the proposal design were often known by one of the core partners, even if new partners were identified through targeted research on Internet.

As regards research fellows, the project gave the possibility to researchers to work on the topic of Minilubes. Without the project, most of them would have carried out research on another topic:

- One researcher explained that she was given a PhD position in her University in her country but applied for a MSCA fellowship related to the Minilubes project because it was an opportunity to work in an international environment. She considered this element as a key asset.
- Another researcher mentioned that he wanted to work on tribology and Minilubes was a good opportunity for that. Without Minilubes, he might have searched for a job in industry.
- Another researcher stated that she would have made a PhD anyway if her application was not selected.
- Another research underlined that he found the opportunity for the position on Euraccess. He was away from Europe few months before he applied and the project gave him the chance to carry out research in Europe. Without Minilubes, he would most likely have found a job anyway.

A4.3.2.3 Set-up and administration of the MSCA project

Interviewees explained that the reporting was time- and resource-consuming. It was said that for small organisations, it is sometimes complex to run such a project because of the administrative reporting. All interviewees noticed that the administrative staff at ACT was very professional and helpful and deeply contributed in provided support for all administrative issues.

Interviewees also underlined that the project suffered from a lack of resources for the cost associated with the use of research facilities during research and experimentation activities. For example, some participants in the projects had to cover the costs for the instruments or the chemical products that were consumed during the research activities. In order to enable the PhD and post-doc students to use the research infrastructure, the scientific coordinator also had to set-up an internal "strategic research project" that had to be accepted by her hierarchy. This project provided the coordinator with additional resources that provided her with the possibility to access the research infrastructure of her company.

Project participants requested additional EC resources to cover these costs, but what was given was not sufficient to cover the actual expenses.

Regarding fellows, they were all satisfied with material and financial conditions they were given for their research activities.

A4.3.2.4 The delivery of the MSCA project

The project involved 11 PhDs students and 2 Experienced Senior Researchers.

Three conferences were organised for the research fellows (one in Vienna, one in Vigo and one in the premises of the coordinator). During these conferences, training sessions were delivered with the aim of enabling researchers to look beyond their individual scientific fields. For that purpose, presentations were made by the different organisations involved in Minilubes. That provided the researchers with a comprehensive view of research on ionic liquids, from fundamental research to industrial applications.

Researchers all acknowledged that these conferences were very positive to that respect and gave them the opportunity to exchange experience on ionic liquids from different points of view.

At the beginning of the project, consortium members agreed on generic selective rules for the selection of researchers. The coordinator indicated that the topic was not well-known in the research community which led to difficulties in finding candidates. More precisely, the coordinator stated that at that time, there were few Master degrees in Europe on tribology and lubrication. For that reason, at the beginning, many applicants were people from India or China and very few came from Europe.

Participants had to activate their personal networks to advertise the call for projects. This was successful since the coordinator indicated that they eventually received sufficient eligible and good applications.

Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

The impact on organisations is outstanding. Interviewees underlined that the project made them become more internationalised. Even if they were open to international cooperation prior to Minilubes, the project made them more confident for enhancing their partnerships afterwards. These organisations would most likely have become more internationalised without Minilubes but the project clearly contributed to a higher level of internationalisation.

The coordinator explained that, after Minilubes, her company launched other projects on ionic liquids oriented towards application for the industry. Projects were less focused on research and more on specific applications. A patent application was filed and the interviewee indicated that the company was thinking of filing a second application (on vacuum applications).

The PhD student who spent most of his time at Tekniker was eventually hired by Tekniker. The representative of Tekniker who was also interviewed explained that the project gave the Foundation the possibility to strengthen expertise and knowledge on ionic liquids.

The impact of Minilubes on research is rather limited. Even if the project resulted in plenty of publications and a couple of patents, research capacity of participating organisations has not dramatically increased.

Organisations gained knowledge on specific applications of ionic liquids as lubricant during the project. They carried on doing research on this topic after the project but not sufficiently to talk about a "breakthrough". In other words, the project provided organisations with resources for research projects on ionic liquids and the EC funding has a leverage effect in the sense that some organisations spent additional own

resources on this topic. However, once the project ended, the organisations did not really increase their efforts on research projects on this topic.

Impacts on structured training and professional development programmes for researchers

Minilubes is consensually described as a success to what regards training. Even if one of the partners has been involved since in another ITN, the project did not have sustainable effect on the development of training programmes for researchers. Once the project ended, nothing remarkable was put forward regarding training, apart from the sessions organised in the context of LUBMAT (see below).

Impacts on international collaboration / networking / researcher mobility

Organisations involved in Minilubes did not have a deep experience in EC projects prior to Minilubes. Most of interviewees explained that Minilubes contributed in increasing their willingness to participate in European projects but they also emphasised the fact that internationalisation was not as important when they applied for Minilubes as it is now. In other words, organisations are keener on cooperating in European/international projects now than they were in 2007. Minilubes increased their confidence in these projects, but this would have partially been the case without Minilubes.

Every two years, Tekniker alongside Jost Institute organise a European congress called LUBMAT. In 2016, there were 150 attendees, of which half from the industry participated in the event. Sessions were organised on ionic liquids. The interviewee from Tekniker explained that these sessions were a follow-up of Minilubes and that this project provided new contacts of people who participated afterwards in LUBMAT.

Impacts on business-academia collaboration / knowledge transfer

Apart from the pre-existing relations among some of the partners, research-industry linkages were strongly dependent from persons going from one organisation to another during the project. Minilubes confirms how relevant it is to link research to academia but, once the project finished, everyone get back to their usual business. From that perspective, one can argue that the project participated in the increase of awareness to better link research and industry, but did not really succeed in strengthening these links: organisations that participated in Minilubes are carrying on working with industry but no more than they did prior to Minilubes.

Three researchers explained that they work for the industry now and indicated they have no time for doing research projects at the time being. They are fully busy with conducting applied research for industrial clients. One interviewee regretted that further cooperation with industry was not given sufficient attention. He said that Minilubes was a momentum to develop industrial application of ionic liquids and that the interest of the industry has decreased since. He underlined that Minilubes did not succeed in maintain this interest.

Unexpected impacts at organisational level

No unexpected impacts were reported.

Impacts at the fellow / researcher level

Impacts on researchers' skills

The interdisciplinary of Minilubes provided the researchers with strong assets when they searched for a job.

Two interviewees explained that what they learnt during the project is still helpful for their current work. One explained that her thesis was on polymer and chemistry and that she now works on tribology. The time she spent on tribology during the project

gave her good basis for her current work in the industry. Another underlined that the general knowledge she acquired during the project gave a good basis for her current work.

Impacts on researchers' careers

All interviewees indicated that the project sped up their research careers. Those who were involved as experienced researchers gained further experience. The PhD students who were interviewed stated that the MSCA was an opportunity to work in different organisations and to exchange both with academia and industry.

Unexpected impacts at researcher level

One important unexpected impact relates to the fact that thanks to the project, researchers learnt to work with people with different cultures. Intercultural and interdisciplinary exchange is a remarkable aspect of the projects. Those who were interviewed worked in several countries during and after their fellowships. Several researchers now work in a foreign country and all testify their belonging to a European Research Area and more generally to Europe.

A4.3.3 ITN case study – WAVETRAN

A4.3.3.1 Introduction to the MSCA project

Table 69. Overview of MSCA project

Name of project	WAVETRAN2
Name / type of the coordinator	Energy Centre (private non-profit organization) (Portugal)
Name of Action	ITN
Introduction to project	WAVETRAN2 project was initiated to address skill needs for wave energy professionals. The type of training that this project provided to its fellows included hands-on practical training complemented by courses on all relevant topics. As the wave energy sector is increasing, this project was expected to have a positive impact on the sector.
Names / types of all other partners	<p>Fundacion Tecnalia Research & Innovation (research center) (Spain)</p> <p>SPOK (business) (Denmark)</p> <p>Ecole Centrale de Nantes (university) (France)</p> <p>AWS Ocean Energy Ltd (business) (United Kingdom)</p> <p>Technische Universiteit Delft (university) (Netherlands)</p> <p>Queens University Belfast (university) (United Kingdom)</p> <p>Aalborg Universitet (university) (Denmark)</p> <p>The University of Edinburgh (university) (United Kingdom)</p> <p>Instituto Superior Tecnico (university) (Portugal)</p> <p>University College Cork, National University of Ireland (university) (Ireland)</p> <p>Wave Dragon Ltd (business) (Denmark)</p> <p>Norges Teknisk – Naturvitenskapelige Universitet (university) (Norway)</p>
Narrative on participating partners	The participating partners are universities and business from eight European countries. The participating businesses in this ITN are SMEs. All businesses are involved in developing wave energy solutions.
Narrative on participating fellows	22 early stage researchers were involved for a period of 606.5 research months. Fellows were early stage researchers who did not have much knowledge on wave energy yet. In addition to access to events and conferences, they received a choice of technical and non technical courses to become more proficient in the niche expertise of wave energy (such as hydrodynamic design, PTO (Power Take-Off) design, instrumentation, energy storage, cost reductions, paths to successful deployments, socio-economic benefits of the sector and legal issues: licensing, conflicts of use, EIA procedures, grid

	connection, regional differences, etc.)
Project budget (EUR)	EU contribution: EUR3.6 million TU Delft contribution: EUR300 000 Aalborg University contribution: EUR240 000
Start and finish date of project	October 2008 – June 2012

A4.3.3.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The main purpose of the project was to overcome the small knowledge base on wave energy in Europe, according to the coordinator and one of the partners. Due to the small number of experts on the topic in Europe, cross-border collaboration has become essential for this sector. Partners indicated that the most important reason for them to participate in this project was the international character of the project and the fact that this project brings together diverse organisations from academia and business.

Wave energy is a rather niche area of expertise. Few suitable training opportunities were offered to students and only few students attended any education on the topic prior to the project.

The aim of this project therefore was to train students in the field of wave energy and to enhance the knowledge base of this field. Enhancing the knowledge base in general is the long term aim of this project. It was expected that through this project, industry will benefit from qualified personnel, and universities will be better able to offer courses that they were not able to do so before. One of the interviewed project partners also emphasized the importance of generating knowledge about wave energy for society at large. The medium term benefit for the project partners in this project was that the knowledge they gained from participating in this project enhanced their competitive position nationally and within Europe. Creating knowledge on wave energy and tapping into that knowledge for commercial reasons, was however, the main rationale for these partners to participate. Another reason for medium term benefits for partners were the network opportunities of this project. It was indicated that international cooperation becomes much easier through a MSCA project.

Becoming part of a European network on wave energy was a clear driver for the participants. WAVETRAIN 2 existed to a large extent of the same partners as the first (MSCA-funded) WAVETRAIN project (roughly 70% of the partners was the same as indicated by the coordinator). One partner that joined for the first time in the second round, indicated that they appreciated that the consortium had built the experience in the first round already. The new partner did not have any experience with MSCA or European projects before and valued the knowledge and experience the consortium from the first round had already built in terms of the processes. It also felt to them as if by then the existing consortia had become 'the European network' to become part of in the field of wave energy. It should be clear however, that most companies did have some cross-border collaborations prior to this project, due to the nature of the work. WAVETRAIN2 further enhanced that cooperation.

The added value of MSCA funding

According to the coordinator, MSCA added value in its combination of research and training, which especially for this sub-sector of energy is insufficient. Furthermore, because MSCA funding required a relative low score for TRL, the partners were really able to focus on a more essential abstract level and in the phase of concept development rather than direct product development. This was considered to be a big

advantage of the MSCA project and exactly at the phase in which wave energy in Europe currently is in terms of applying research.

- One partner mentioned the difficulty in explicitly indicating the added value of MSCA funding. For this organisation, the WAVETRAIN2 project was part of an international strategy to grow the presence in the field of wave energy. This strategy existed of a number of international and EU projects aiming at more or less the same results. MSCA funding was additional to national and regional funds for this partner, as these funds did not enable this organisation to grow an international presence in wave energy.

A4.3.3.3 Set-up and administration of the MSCA project

The WAVETRAIN 2 project is the successor of the first WAVETRAIN project which received MSCA funding as well. The coordinator of the second WAVETRAIN project also coordinated the first project and the experience he gained through this first project made it a lot easier to understand and manage the requirements of MSCA in this project.

Regarding the budget, partners have indicated that it was sufficient. One partner indicated that it was known up front that additional resources were needed to enable fellows to test the renewable energy solutions they were developing. Another partner commented that the budget related to facilitating and training the fellows was sufficient. However, this partner could not cover all of the management costs of this project from the budget provided by MSCA. This was mainly due to a lack of experience in working with MSCA projects. After WAVETRAIN 2, this partner participated in MSCA projects again and did not encounter this problem anymore. With regard to the budget, the coordinator expressed his appreciation for the fact that the EC simplified the rules on financial reporting.

The business partner did not experience any burden in participating in the MSCA project. He indicated an experience of more than 20 years in working with EU funding schemes and he was therefore used to the administrative aspects of these kinds of projects. The only difficulty which the business partner sometimes had was the difference between local demand and EU rules, but this was more generally speaking. Furthermore, it was highlighted that this was the second MSCA project in this field and with these partners. This made it much less complicated to deal with the administrative aspects. The coordinator of the project, who coordinated the first project as well, was therefore able to very efficiently organize this second project. This coordinator commented that he himself was not exposed to any administrative burden as it was dealt with by other staff at his organization. In his opinion, however, there was no administrative aspect which was really critical. The most difficult in this respect was the cooperation with the partners in handling the administrative aspects of the projects. Most partners were very motivated to provide training, but were less motivated to deal with the administrative aspects. The experience was that cooperating on the administrative part was more difficult as this was done by administrative staff at many partner organizations rather than by the supervisors of the fellows.

Another partner mentioned some difficulties in working with the different cost categories. However, this was considered to be caused by a lack of experience in working with MSCA projects. In a new ITN project in which this partner is participating, they did not encounter these problems anymore. This is not due to changes in these administrative aspects as the partner commented that these remained the same.

The process of consortium-building for WAVETRAIN was very easy according to the coordinator. A total of 70% of the partners in this consortium were the same as the

partners in the first WAVETRAIN project. Some changes were made due to businesses getting a different strategic focus and people who retired. These partners were replaced by new partners of which Tecalia is an example. The most important criterion for recruiting new partners was the ability to provide high quality training. The coordinator also looked for companies which could provide access to prototype testing to give students the opportunity to get hands-on experience. When asked about the process of consortium building in the first WAVETRAIN project, the coordinator commented that it was very easy to establish the consortium. Due to a long tradition of the coordinator with international cooperation on wave energy he had a very good view on the European wave energy field and he knew which businesses and universities would be relevant and useful partners in this project.

Note that the website of the WAVETRAIN2 project (<http://www.wavetrain2.eu/>) is not online anymore (the project finished in 2012). It is also hardly mentioned at the websites of the business partners in this project. Most universities still provide some information on this project.

A4.3.3.4 The delivery of the MSCA project

- The research goal of the WAVETRAIN 2 project was to enhance the international knowledge base on wave energy. At the time of this project (2008-2012) wave energy was a small field and it was necessary to advance the understanding of this topic to realize the potential of wave energy solutions. It was also necessary because the industry had a shortage of qualified personnel. In this respect, WAVETRAIN had a big impact on the industry. As the coordinator explained, this project altogether trained about 40 people. He estimated that this is roughly 10% of all professionals in Europe specifically working on wave energy.
- The coordinator of this project indicated that eight to ten new courses were developed for the fellows in this project. These courses went beyond the direct focus of the individual research projects of the fellows and discussed the economic aspects of wave energy, public policies and environmental impact. Most of the courses were provided by the partners in this project and continued after the project was completed. One business partner indicated that he developed courses together with a university partner. These courses were not newly set up, but the new training was integrated in the existing curriculum at universities. It is for this reason that these courses also continued after completion of the WAVETRAIN 2 project. People from business then were invited to participate as a guest lecturer in these courses. These courses were furthermore offered on a BSc and MSc level and not so much on a PhD level. This has to do with the small number of students in the specific field of wave energy: "How should you repeat a course? There are not many people working in this field". Besides the courses which were developed within the existing curriculum at universities, seminars were organized around the topic of wave energy.
- Both the coordinator and partners could not recall any difficulties with the MSCA project and in general they were very happy with how the project went. The only thing that one of the partners mentioned was that in his view, fellows should be able to go to other partners for a couple of months. This would benefit the learning process. However, due to the relative short time period of three years this was too complicated as it was not possible to fit such an exchange in both the fellow's plan and the company's or university's plan.
- The partners who were interviewed for this case study did not mention any serious problems regarding the recruitment of fellows. One partner indicated that the majority of partners in this ITN project were universities. They had

access to a large pool of potentially interested fellows. Another partner had more difficulties, but it ascribed these difficulties to the fact that this organisation was unknown in the field and the fact that wave energy is a small sector. It was also inexperienced with hiring people from other countries, which didn't make it easier to attract fellows. This partner did the recruitment of new fellows entirely on its own and it had therefore had to design a new English recruitment process to recruit people from other countries. This partner also illustrated the impact of WAVETRAIN2 on the exposure of this organisation in the European network on wave energy by indicating that the number of applications for their most recent MSCA project on wave energy was five times higher than the number of applications of fellows for WAVETRAIN2. According to the coordinator, it is usually not a problem to recruit proper candidates but it really depends on the organisation who is recruiting them.

- The interviewed partners did not encounter any difficulties in the delivery of the project. Everything was done on time and one partner indicated this to be one of the reasons for being successful in applying for MSCA funding afterwards again. The coordinator mentioned the replacement of some fellows due to underperformance or health related issues. This, however, did not have a critical impact on the delivery of the project.

A4.3.3.5 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

One partner indicated that the direct impact of the MSCA project was that it now had access to very specific and (at the time) new wave energy knowledge. The fellow's research focused on the combination of wave and wind energy solutions and it was this combination which made the fellow and the business partner renowned in the field of wave energy. People in the industry were talking about this combination already for a while, but this project made it finally possible to make it real. The fellow was furthermore interested in the socio-economic side of wave energy and cooperated with a US based fellow on this topic. The expertise in these two specific areas of wave energy attracted attention from new (international) clients for the business partner. The business partner could also serve these new clients very well as the fellow remained working for this business partner as an independent consultant after completion of the MSCA project. In summary, wave energy was a field of interest to this business partner before this MSCA project, but the MSCA projects enabled the business partner to explore new directions within this field.

Another partner mentioned its presence in the European field on wave energy as the most important impact from the WAVETRAIN2 project. However, this partner found it very difficult to indicate the extent to which this could directly be ascribed to MSCA funding. As mentioned before in this case study, the WAVETRAIN2 project was for this organisation part of larger global strategy on gaining an international position in this field.

The coordinator also mentioned the opportunity in this project to hire excellent researchers as a very positive impact. These researchers could be hired because the salaries in this project were higher as compared to what the research institution could normally offer to research fellows. After completing their research projects within WAVETRAIN2, some fellows decided to stay working at the research institution of the coordinator and accepted a lower salary than what they were used to.

Impacts on structured training and professional development programmes for researchers

Participating in the WAVETRAIN2 project increased the willingness and ability to provide professional development programs to researchers of at least one of the partners interviewed for this case. Due to this project this partner enhanced its international position in the field of wave energy. As a result, it was able to grow its wave energy department and due to the increased ability to provide professional development programs is now able to hire inexperienced wave energy professionals as well.

To facilitate the growth of the wave energy department and to be able to attract international research fellows one of the partners also had to change its recruitment procedures. These changes were not so much focused on making the process more open or merit-based but rather on enhancing the ability to attracting international staff. A concrete change is for example the design of recruitment activities and procedures in English rather than only in the national language. Again, this partner found it difficult to connect a specific part of this change to participating in WAVETRAIN2.

Impacts on international collaboration / networking / researcher mobility

The MSCA project had a big impact on partners' ability to work with organisations outside their own country. As a business partner indicated, the MSCA project made it much easier to organise a group of partners around the topic. It enabled the business partner to get to know other organizations and it created a network which can be used to call people and discuss issues. Without MSCA it would have been much more difficult to find partners in countries that partners did not work in. The business partner who made this comment is a small sized company without an international network. Another distinguishing element of MSCA which was mentioned in this respect was the more informal way of collaborating on an issue without setting clear objectives. This has stimulated the willingness of partners to participate and it also stimulated the learning process on wave energy.

For one partner, WAVETRAIN2 really opened the door to European wave energy networks. After the completion of WAVETRAIN2 it participated in a third ITN project on wave energy called OceaNET (<http://www.oceanet-itn.eu/>). The partner indicates that WAVETRAIN2 contributed to roughly 20%-25% to the changed focus of the organisation. This project was also mentioned by a business partner, but he indicated that business partners were excluded from participating in this project.

All the interviewed partners expressed a general enhanced ability to cooperate with other partners on an international level. Being part of this international network and being able to collaborate internationally stimulates information exchange and knowledge development. Business partners have profited from this in the sense that they were able to grow their businesses abroad. For research institutions, it is particularly in terms of research itself that their ability to collaborate internationally has increased.

Impacts on business-academia collaboration / knowledge transfer

- One partner argued that it mainly collaborates with universities and other research institutes but this is not very different than before. The biggest difference in terms of knowledge transfer lies in the international character it now has. Similar comments on the collaboration between businesses and academia have been made by the coordinator of the project.
- One partner interviewed for this case study mentioned no specific innovation results. It did not develop any new products or services and it didn't apply for

any patents or other forms of IPR. This also was not the objective of this partner in participating in this project. The main objectives were basic research, training people and the opportunity to participate in European wave energy networks.

Unexpected impacts at organisational level

- The interviewed partners and the coordinator do not recall any positive or negative unexpected impacts of this project at organisational level.

Interviewees:

Project coordinator Antonio Sarmento, WAVEC/Offshore Renewables – Centro de Energia Offshore Associacao

Jose Villate, Fundacion Tecnalia Research & Innovation

Hans Soerensen, SPOK Denmark

A4.4 RISE case studies

A4.4.1 RISE case study – GLYCANC

A4.4.1.1 Introduction to the MSCA project

Table 70. Overview of MSCA project – GLYCANC (RISE)

Name of project	
Matrix glycans as multifunctional pathogenesis factors and therapeutic targets in cancer - GLYCANC	
Name / type of the coordinator	Westfaelische Wilhelms-Universitaet Muenster (WWU) (University) (Germany)
Name of Action	RISE
Introduction to project	The overarching aim of the project was to support the progression of research into the role of glycans in cancer metastasis in multiple types of tumours. The project therefore includes research groups specialising in different cancer cell lines, including breast and brain tumours, using a range of different methodologies and technologies. The project also includes business partners providing products and analytical technologies to support the research activities. This research will provide a solid foundation of knowledge for the development of multi-targeted anticancer approaches. Key to the progression of this research is the exchange of knowledge, and training of researchers in complementary fields of research and skills.
Names / types of all other partners	<ul style="list-style-type: none"> ▪ Universite De Reims Champagne-Ardenne (URCA) (University) (France) ▪ Universita Degli Studi Dell'insubria (UNINS) (University) (Italy) ▪ Panepistimio Patron University of Patras (PATRAS) (University) (Greece) ▪ Uppsala Universitet (UPPSALA) (University) (Sweden) ▪ National Center For Scientific Research "Demokritos" (Research Organisation) (Greece) ▪ Serend-IP GmbH (Private For-Profit Entity) (Germany) ▪ Fidia Farmaceutici Spa (FIDIA) (Private For-Profit Entity) (Italy) ▪ Semmelweis University (University) (Hungary) ▪ Universidade Federal Do Rio De Janeiro (University) (UFRI) (Brazil) ▪ Cairo University (Cairo) (University) (Egypt) ▪ Consejo Nacional De Investigaciones Cientificas Y Tecnicas (Conicet) (Research Council) (Argentina) ▪ Ewha Womans University (Korea) (University) (South Korea)

Name of project	Matrix glycans as multifunctional pathogenesis factors and therapeutic targets in cancer - GLYCANC
Narrative on participating partners	The partner organisations involved in this project include a mix of universities, publicly funded research organisations and companies. These organisations each have different scientific and technical specialities, offering the consortium a wide range of knowledge, skills and services.
Project budget (EUR)	EU funding: EUR567 000 ²⁶⁷ Funding from other sources: EUR99 000 Total: EUR666 000
Start and finish date of project	July 2015 to June 2019 (ongoing)

A4.4.1.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

The GLYCANC project emerged from the recognition of the potential relationship between Proteoglycans and Glycosaminoglycans, and cancer, and seeks to foster a deeper understanding of this research area. In doing so, this project brings together the combined expertise of the consortium partners, in a range of techniques and specialities, to not only push this research area forward, but to incorporate extensive knowledge transfer and training for researchers into their research activities.

Given the small size of the research community working in this area, many of the coordinators and project leads knew most of the research groups previously through conferences and personal networks. While some of the partners had existing collaborations, a number of the connections were new, and as such this project offered the opportunity for partner institutions to intensify cooperation and formalise new partnerships. Some partners, such as Semmelweis University, had no prior collaborations with any of the partners and this project was a good opportunity to form connections with research groups both within Europe and further afield. These collaborations were perceived to be particularly important for universities and research institutions due to the relative novelty and interdisciplinarity of the research area, and the complementary specialisations of the partners involved. As such, each partner was motivated to participate in the project by their interest in exploring, developing and sharing a range of different methodologies, knowledge and materials to help bring the research community closer together and push the collective research area forward.

Key to this sharing of knowledge and research progression is education and training of staff and students, cited as one of the primary motivations by both the partners and the researchers themselves. Further to this, researchers were motivated to take part in secondments by the added professional and personal experience of working overseas with a different research team.

The motivations for the industry partners were slightly different, as they were also interested in spreading knowledge about the techniques, products and services they provide. Prior to their involvement in the project, one of the business partners, Serend-IP, had been working in a different area of research, and though they were not

²⁶⁷ http://cordis.europa.eu/project/rcn/194382_en.html

initially aware that project funding was not included, this project allowed them to explore additional applications for this technology and thus potential future markets.

The added value of MSCA funding

Despite a number of previous bilateral exchanges between some partners, the size of the MSCA project was vital for the success of the collaborations within this new consortium. The capacity for greater international scope within MSCA was particularly valuable as it allowed the consortium to foster greater collaboration with the research groups in both Argentina and Egypt as these countries were eligible for EU funding. This was perceived not only to be valuable for forming a tighter network, but for the more efficient exchange of awareness and knowledge of experimental technologies and methods within the research area.

While some partners had been involved in other EU projects, and even other MSCA projects, it was thought that the RISE programme was unique in its focus, offering a different kind of support and value. In particular, it was the added value for students participating in this project was significant, facilitating their personal development in the form of wider experience, skills and the opportunities to produce publications. Furthermore, the focus on teaching allowed some of the partners without formal educational focus, such as Demokritos, to help them improve the education provided across their organisation.

Serend-IP noted that without their involvement in this project, it was unlikely they would have collaborated with all of the partners they had done, or have taken any international students into the company for training purposes. As a very small start-up (3 people), this project had a positive impact on increasing the industry based, technical skills of using this technology in the research field.

A4.4.1.3 Set-up and administration of the MSCA project

Given the pre-existing familiarity of the partners, their mutual interest and complementary skills, the recruitment process was considered to be relatively straightforward. This process was further facilitated by the coordinator's experience of managing international projects and the presence of a dedicated administrator. The consortium decided to hire a project assistant to handle administration and support for the partners. This was noted as being very helpful to all and alleviated some of the administrative burden for the participants.

Some partners were more involved with the application process than others. Therefore the burden of cost was higher for some organisations. It may be harder for companies to be involved in the application process if they are not willing to dedicate time to development activities without a guarantee of financial recompense. This was the case for Serend-IP GmbH, for example. As more of the expertise regarding proposal writing lay with the universities, it was considered they were in a better position to prepare the bid.

A4.4.1.4 The delivery of the MSCA project

The overarching aim of the project was to support the progression of research into the role of glycans in cancer metastasis in multiple types of tumours. As such the project includes groups specialising in different cancer cell lines, including breast and brain tumours, different cellular process and structures, and different methodologies and technologies. This research will provide a solid foundation of knowledge for the development of multi-targeted anticancer approaches. Key to progression of research in this field is the exchange of knowledge and training of researchers to foster the interdisciplinarity capabilities of the research groups.

This was achieved through the secondment of students and researchers to partner organisations, to learn these new methods and/or complete collaborative projects.

Secondments lasted between 2 and 12 months. The secondees were selected according to specific criterion that required them to have worked with the sending organisation for a certain amount of time prior to application, serving to narrow down the number of candidates. Given the smaller size of these research teams, this was generally perceived to be sufficient for identifying suitable secondees. The training offered during the secondments was, for the most part, delivered in the labs through practical, hands-on experience of working with the different methodologies and instruments the host organisation specialised in. Delivered by colleagues and technical specialists at their host institutions, the researchers were able to develop skills they would not have otherwise had, as the secondees often came from a research group with a very different background. Given the research focus of the consortium, each partner provided the general equipment and space for secondees to undertake significant amounts of bench work during their time. The funding was considered to be appropriate for the support needed. In general, the budget was at the right level for the secondment, knowledge transfer activities, and providing for the needs of the secondees and their host partners. In order to ensure standardised outputs from the secondments, all secondees were asked to produce reports, detailing their results and experiences, both professionally and personally. Furthermore, these secondees often participated in presenting their findings and attending conferences.

The management and delivery of the project was thought to be running well, with each of the partners across the consortium following through on their commitments.

While much of the research conducted as part of the GLYCANC project was in line with the partner's existing research areas, the project allowed for and actively encouraged the exploration and application of different methods and techniques. It also allowed for research groups to apply existing techniques and capabilities into new research areas. For example, the previous research focus of Serend-IP involved the application of their highly sensitive and unique analytical technology to inflammation, their involvement in this project allowed them to explore the applications of this technology to cancer related research.

There were some issues related to the unstable political situation in the Middle East that hindered the Egyptian exchanges due to difficulties in getting visas. This resulted in delays of the individual secondments. Timings of exchanges were also adjusted to account for national holiday periods such as the secondment between FIDIA and PATRAS. These issues are not attributable to the structure of the MSCA. This problem was managed by being flexible in when exchanges took place with the project and still resulted in a number of secondments that was largely in line with the project proposal.

This flexibility was also necessary to accommodate difficulties in finding the appropriate personnel for secondments due to difficult economic situations, and associated funding cuts, in several of the participating countries, including Egypt, Brazil, France and Germany. Given the nature of the work programme proposed for the GLYCANC project, the partners are dependent upon other funding sources to perform the research itself and where funding was hard to obtain, they were limited by this. In this situation, while the national funding for Universidade Federal Do Rio De Janeiro (UFRJ) was negatively affected by the national financial crisis, they were able to secure additional funding from the German academic exchange service (DAAD) for a post-doctoral visit, as they were not eligible to apply for MSCA funding.

A4.4.1.5 Impacts of the MSCA project

The project is on-going, therefore the final impacts have not yet been realised. While it is difficult to ascertain the full extent of these impacts, the short term impacts are potentially indicative of the benefits this project will have once it has come to a close.

The impacts of the GLYCANC project are generally perceived to be very good, with a significant increase in the collaboration between research groups working in this research area to a level that has not existed before. The majority of the collaborations have been considered to be fruitful and beneficial to the participating partners. As a result, many of the partners have been able to explore new methods and techniques, generate new ideas, outputs, and collaborations.

Furthermore, the project facilitated collaborations between partners that might not have otherwise been sought. For example, this project was noted for opening up awareness of, and willingness to work with other partners in the consortium.

Impacts at the organisational level

Impacts on research excellence

As a result of facilitating a closer network of researchers, each partner is better positioned to access a wider range of equipment, methods and knowledge. The benefit of such access to knowledge is reflected in the dissemination of the knowledge and skills of working with microRNA across the group, triggering new manuscripts to be developed. Further to this, the project has served to shape the direction of research for WWU whereby they were more exposed to a previously peripheral research area and are now working on new projects and developing the ideas generated because of it.

This project was thought to be useful for Semmelweis University as they were able to access partner research groups they would not have had access to otherwise, allowing them to not only collaborate with, but ask questions from and seek advice from other partners, thus improving their research capabilities.

The project is beginning to see impact in the form of publications. Two manuscripts produced by the consortium in relation to the cooperative work have been accepted for publication and several others are undergoing minor revisions. Furthermore, the group has produced a high impact report on glycan science and the treatment of cancer, which The Cancer Cell journal has expressed interest in publishing. While this process is still underway, it reflects a growing interest in the field and their work is gaining attention and traction with the research community.

As a result of the mobility of a student from Patras in Greece to the Serend-IP, a new model system was developed and is now being used across the group. This reflects the ways in which the project has facilitated the dissemination and consolidation of research methodologies in this particular research area. Furthermore, through their involvement in the project, Serend-IP were able to explore novel applications for their technologies and in light of some good results already achieved within collaborative work with consortium partners, will likely continue to do so in the future.

Impacts on structured training and professional development programmes for researchers

Given the nature of this project and the bench based training offered to the secondees, the training and professional development is less formal and structured. As such, there were very few structured training programmes provided, and where structured training was provided, it involved one-to-one guidance on how to use a piece of equipment or technology, such as that present at Serend-IP.

As Serend-IP is such a small company with such delicate equipment, it was perceived that training delivery was costlier for them as they are not well equipped to provide such training and it was time consuming. Given their small size, the time required for training made the project less financially appealing, though still valuable.

The presence of the secondee at Demokritos improved the training provided through the experience gained by the project lead and has informed the discussions about training provided within the organisation. Given that Demokritos is a publicly funded research institute and not a university, the project lead previously had more experience in project management of funding grants for research. As such, this project equipped him with a new set of skills associated with providing training and support to younger researchers from other countries. This included more practical experience of bringing in researchers from other countries, helping them to understand different research cultures and visa regulations.

This was echoed by the project lead at Semmelweis University who thought that the project had provided such good experience of hosting a PhD student from Egypt that it could facilitate more PhD training being offered in the future.

Impacts on international collaboration / networking / researcher mobility

This project fostered international collaboration of all of the research groups involved, an impact that manifested in a number of different forms. While there had been contact between some of the participating partners prior to the project, these had largely been in the context of bilateral exchanges and as such, the MSCA funding has been vital for fostering new links between other participating members. For example, while CAIRO had previous contact with WWU, the project has fostered contact between WWU and almost every other partner in the consortium. These connections have also been developed within Europe, with new interactions between WWU and PATRAS, UNINS, and URCA. For some of the partners, these collaborations were entirely novel. One example of this is research group at Semmelweis University, who had not worked with any of the partner organisations before and as such the GLYCANC project was a very good opportunity to get closer contact with other researcher groups it might have otherwise been difficult.

First and foremost, the integration of international students into the host research teams provided the organisations with opportunities to learn more about other cultures, perspectives and develop their communication skills. For example, the inclusion of a student from Cairo into the research team at Demokritos encouraged the whole team to speak in English, thus fostering the development of the communication capabilities of the whole team. This reflects the 'international flair' brought to the team and was thought to improve the organisations understanding of other research and education systems. Furthermore, it has improved his capacity and willingness to engage with students from other countries, encouraging him to this more openly about recruiting students through other transnational mobility programmes such as Erasmus.

While some of the partners were placed within organisations with strong history and structures for facilitating international exchange of researchers, others were less familiar with the processes. The experience of bringing, and sending, researchers from other countries helped Demokritos and Semmelweis University to develop and strengthen the administrative capabilities within their organisation. Within these organisations, the administration departments gained more experience of the process of processing international students' and researchers' movement to their countries. This was thought to be particularly valuable as it may be applied to other projects undertaken by the organisations, as well as future applications.

All of the participating partners found the project fruitful and are positive this will continue for the duration of the project. In order to maintain the success and sustainability of the project, the consortium is now undertaking application for ITN funding under the MSCA programme. Furthermore, UNINS and Cairo University have been successful in obtaining funding for further bi-national exchanges, facilitated by their fruitful collaboration under the GLYCANC project. Given their successful

involvement in the project, Serend-IP are now also part of another MSCA-RISE project, MOMENDO268, as they were more familiar with the process and requirements of such a project.

For Serend-IP, the project has had a positive impact upon their future perspectives of hiring individuals from other countries in the future, should the company grow and start hiring. This will be particularly valuable if the company decides to continue to work in this field of research in the future as they will be looking to hire people with knowledge and experience of conducting research in this field. As a research focused company, Serend-IP found the opportunity for building connections in other parts of the research community very valuable, thus while their willingness to engage in research has not changed, their capacity to expand their research focus has.

The project also facilitated a small but well received workshop, involving the project partners as well as some international experts in the field. This workshop, hosted at WWU was enabled by the small amount of MSCA funding and the willingness of the host university to cover some costs. Furthermore, members of the consortium have been involved in organising key international meetings in the field, such as the FEBS Lecture course, Matric Biology Europe and 2 international meetings on proteoglycans. This reflects the ways in which the consortium members are disseminating their results and engaging with networking activities further afield.

Impacts on business-academia collaboration / knowledge transfer

This project has not only resulted in the transfer of knowledge and people, but also of technologies and techniques. Examples of this include the exposure of consortium partners to the proprietary, state of the art techniques of Serend-IP, or the novel application of a new analytical technique, developed by the URCA research team, by many partners. Both processes have been applied by partner research groups and immediately included into manuscripts. It was thought that while the commercialisation of the analytical techniques developed by URCA has not yet been realised, there is a clear potential for IP in the future.

For Serend-IP, involvement in this project has increased the international exposure of their product and services to a wider range of potential clients. This reflects one of the impacts of the project, as the partners are more aware of what the company can offer, increasing understanding of the capabilities available within the network and the potential for other applications of the technology offered by Serend-IP. While the company has not received any paid work from the project, it is hoped that awareness and interest spread by seconded students and collaborators will manifest in increased orders in the future.

Unexpected impacts at organisational level

One of the unexpected impacts of the project has been the press coverage received, in both scientific publications and German local press. This coverage highlighted the international dimension of the project and brought more attention to the research area, both of which were thought to be valuable for the participating partners, and the longevity of the novel research field.

Impacts at the fellow / researcher level

One of the strongest impacts on the researchers was the experience of spending time overseas, and the project has encouraged the researchers to become more independent and capable individuals. Furthermore, this experience was perceived as being particularly valuable for their future careers. The impact of the experience was

²⁶⁸ http://cordis.europa.eu/project/rcn/200837_en.html

noted by the researchers to be significant, as it allowed them to gain a better understanding of different cultures and habits, both inside and outside of the lab that would facilitate strong future working relationships.

The opportunity for secondment, and indeed their involvement in such a project, has encouraged and facilitated the formation of the secondees' own network of contacts and friends within the international research community. This was thought to be a very positive impact for both them personally, and for the longevity of the consortium and the future of the research area. Indeed, during the project's mid-term meeting, the young people were actively engaging with other young researchers and fostering the development of such networks.

Impacts on researchers' skills

Given the diverse range of subject areas undertaken at some of the partner organisations, the seconded students also engaged with students and researchers in other fields, both within their host institutions and at conferences. For example, the seconded students hosted at UFRJ, Demokritos and WWU were involved in presenting their findings to researchers from other departments, attending seminars and talking to other researchers. As such, while the seconded students were able to develop their communication skills, they were also able to develop a good understanding of other projects and research areas within the organisations. In particular, the student from Egypt hosted at WWU noted that his German language skills had improved considerably more than he had anticipated and this was thought to be very valuable.

Further to this, the researcher from Egypt also learnt a great deal of lab management skills while at WWU that he would not have learnt whilst in Egypt due to cultural differences including, logistics, communication, and protocol development. While the researcher was not directly involved in teaching, he has done some supervision, transferring techniques to MSc students and giving them practical training. He learned a lot from his colleagues about communication and the different scientific mentality and this has helped him adapt his mentorship style.

For students seconded to Serend-IP, they were offered internally provided training on how to use the companies' analytical instrument. This training was offered during the first few weeks of their secondments, delivered through hands on experience of the unique, patented technology. This gave the students experience and skills they needed for the duration of their secondments. After this, secondees were able to gather their own data to contribute towards projects. As the students would not have been able to access this training outside of the organisation, this reflects both the value the secondment activities of the project and of MSCA in providing such opportunities.

One researcher was able to explore a set of techniques in the field of structural biochemistry, skills that she was very interested in learning, however has not had the opportunity to do so previously. The secondment not only allowed her to develop these skills, but to learn from highly experienced individuals with 20 years of experience of these techniques. Though the researcher had done collaborative work with the host partner before, this secondment allowed her to develop a stronger collaborative relationship with them sooner, and this collaboration has continued after returning to her sending institution.

Impacts on researchers' careers

One of the primary benefits of the project for researchers is the opportunity to continue to build their publication history. The opportunity to engage with cutting edge research and co-author papers was of significant value for them. Indeed, one of the researchers produced a publication based on the research she conducted in her 3-month secondment.

As the project is ongoing, and many of the secondees are part way through PhDs or Post-Docs, the long-term impact on their careers has yet to be fully realised. It was noted by the coordinator based upon prior experience, that for students from particular countries such as Egypt, receiving training aboard was perceived to be very important for future career progression.

Unexpected impacts at researcher level

There have been some unexpected opportunities for career progression as a result of the project such as one researcher who was offered a job due to the techniques he was utilising while on secondment. This job offer was not sought by the researcher, but instead arose from the interest in applying the techniques he was learning to another cancer cell line and reflects the value of such technical experiences for the future careers of secondees.

Documents

GLYCANC Progress Report (2014)

Piperigkou, Z., Mohr, B., Karamanos, N., Götte M. (2016). Shed proteoglycans in tumor stroma. Cell Tissue Res. 2016 Sep;365(3):643-55

A4.4.2 RISE case study – NANOREMOVAS

A4.4.2.1 Introduction to the MSCA project

Table 71. Overview of MSCA project – NANOREMOVAS (RISE)

Name of project	ADVANCED MULTIFUNCTIONAL NANOSTRUCTURED MATERIALS APPLIED TO REMOVE ARSENIC IN ARGENTINIAN GROUNDWATER (NANOREMOVAS)
Name / type of the coordinator	UNIVERSITAT AUTONOMA DE BARCELONA – Department of Chemistry (Spain)
Name of Action	MSCA-RISE - Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)
Introduction to project	NANOREMOVAS pursues to develop and implement a pilot plant for the remote treatment of arsenic polluted waters based on the application of state-of-art advanced multifunctional nanostructured materials, already tested at the laboratory level. In this sense, NANOREMOVAS includes the cooperation between the industry and academia of partners from Europe and Argentina. Besides the required research and innovation to demonstrate the technical and economic feasibility of the developed water recycling technique, the seconded researchers will carry out a series of tasks and outreach activities, promoting entrepreneurship culture and support of young innovative companies in order to set-up technological partnerships within the water and livestock sector. Furthermore, NANOREMOVAS represents a contribution to knowledge and technology transfer from the academia to the industrial sector, through the partners reputation as transfer hubs, that will led to creating designs and industrial equipment/processes/model.
Names / types of all other partners	<ul style="list-style-type: none"> ▪ KUNGLIGA TEKNISKA HOEGSKOLAN (KTH) – School of Engineering Sciences (University - Sweden) ▪ AERIS TECNOLOGÍAS AMBIENTALES S.L. (Private for-profit entities - Spain) ▪ INNOVA BIC - BUSINESS INNOVATION CENTRE SRL (Innovation Support Service Provider - Italy) ▪ INSTITUTO NACIONAL DE TECNOLOGIA INDUSTRIAL (INTI) (Institute – Argentina) ▪ INSTITUTO DE INVESTIGACIONES EN CIENCIA Y TECNOLOGIA DE MATERIALES/UNIVERSIDAD NACIONAL DEL MAR DEL PLATA (INTEMA) (University – Argentinian)
Narrative on participating partners	<p>The Universitat autonoma de Barcelona is a university founded in 1968. It has a high reputation and is according to the World University Ranking (WUR) one of the best universities in Spain.</p> <p>KTH is the largest technical university in Sweden. It is working with industry and society in the pursuit of</p>

	<p>sustainable solutions to societal challenges: climate change, future energy supply, urbanisation and quality of life for the rapidly-growing elderly population. KTH puts a focus on collaboration of academia and the public and private sectors.</p> <p>AERIS is a spin-off of the Autonomous University of Barcelona comprising experts from the GENOCOV research group (UAB). It works with industries and public entities to improve the environmental quality of their emissions.</p> <p>Innova BIC is one of about 200 Business Innovation Centres born Europe. It acts as an innovation catalyst for local development. It has an established and functional organizational structure, has qualified and certified skills and is member of the European BIC Network, which brings together the most important European agencies that meet the standards dictated by the European Union in the field of BIC.</p> <p>INTI is an Argentinian autarkic body whose mission is development, certification and technical assistance of industrial technology in Argentina</p> <p>INTEMA carries out research activities related to basic knowledge and technological development in the area of materials. They offer training of highly qualified researchers and technicians, teaching undergraduate and postgraduate courses in the field of materials and the development and transfer of technology to the productive environment.</p>
Narrative on participating fellows	The research fellow held a PhD already during her involvement with MSCA. She did an internship at one of the partner institutions and became fully employed after she went to Argentina with MSCA.
Project budget (EUR)	<ul style="list-style-type: none"> • EU funding amount: EUR688 500 ▪ Funded under: H2020-EU.1.3.3. – Stimulating innovation by means of cross-fertilisation of knowledge
Start and finish date of project	January 2015 – December 2018

A4.4.2.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

NANOREMOVAS is a project dealing with arsenic polluted water. Arsenic is a major problem in this field due to the high toxicity of it that threatens human health through the food chain and causes chronic intoxication in cattle. There are different technologies available to remove arsenic from polluted water but all these technologies are very complex and expensive to implement. Therefore they are not affordable for smaller and rural areas in Argentina. Cheaper technologies on the other hand cause problems with hazardous waste and are therefore not in line with environmental regulations. With this in mind the aim of NANOREMOVAS is to propose effective, efficient and resilient novel adsorption nanostructured-based materials for arsenic polluted water treatment.

According to the coordinator of the project, the aim of participating within MSCA was to go ahead with the actual researcher development as a tool for the formation and education of new people which can find practical solutions for actual problems. The UAB was involved previously in the coordination of training activities but with MSCA they hoped to make their project more visible to the public and business sector. Furthermore the coordinator thinks of MSCA as a more enriching programme compared to bilateral agreements as different people from different countries come together.

The motivation to participate in a programme like this slightly differs from institution to institution. This domain expertise seems to have been the main motivation to participate and coordinate this project. The KTH for example has a lot of experience in the field of material development on a nanostructural level. Additionally they are familiar with the application of nanomaterial in water-related systems. AERIS has due to the fact of their involvement to R&D in the field of water treatment and waste gases a lot of experience too. As a spin-off of the UAB they do know the ways of academic research. Furthermore they are bringing with them the knowledge of how potential customers approach new technologies.

Innova BIC as a private company has hoped to enlarge their network, creating new relationships with other organisations and countries and acquire new researchers. With their knowledge about technology transfer it was possible for them to act as a broker. MSCA was specifically interesting for them as it was the scheme closest to their needs to move abroad and get involved in an international field with actors from different countries and different backgrounds. It was possible for them to compare their model of technology transfer to the model of other organisations and therefore to exchange ideas and information. The common reason behind the different motivations could be summed up to the fact of the exchange of information, capacity building and the involvement in an international consortium with actors from different sectors. All the shareholders agree that working in a joint task project with an industry-academia collaboration has an enriching effect on all the involved institutions and actors.

The research fellow was involved into the project due to the engagement of her supervisor. As a former research assistant it was possible for her to discover new universities and research organisations respectively to build up new partnerships. She already held a PhD and as such the factor of mobility was crucial. MSCA became the occasion to create partnerships outside of Europe and to exchange different ways of thinking and ideas of research and business.

The added value of MSCA funding

The added value of the MSCA funding lies in the eyes of the project coordinator in the higher visibility of the programme compared to national schemes and/or bilateral agreements. Furthermore through the joint tasks it became possible to include the focus of the industry. This provided the space to discuss the different objectives of the involved actors. This had an enriching effect on the whole project. Another advantage of participating within MSCA is the opportunity to transfer actual research to the industry directly with the outcome of a more feasible product. Without a MSCA funding it would not have been possible to reach this broad range of objectives.

From the perspective of the partner it is also not possible in the same way without MSCA to provide the knowledge about technology transfer or business and marketing. This has been confirmed by the research fellow who mentioned that next to the exchange of skills and ideas the most important added value is the chance to get a real life experience of how innovation can be conducted under real life circumstances. This is something researchers rarely find in their academic education that usually is focused on the fundamental aspects of research and less on the transfer of the knowledge towards the industry to produce a product of high quality. Next to the

aspect of the necessary mobility in the life of a PhD they get the chance to learn things in a more practical way, which is not only useful in terms of skills development but also to improve the chances for their career. Furthermore the research fellows get the chance to meet different people from different sectors that in addition provides them with the opportunity to create a strong network of partnerships.

A4.4.2.3 Set-up and administration of the MSCA project

Generally speaking, the efficiency of the administration of a project is always depending on the unit that handles the project. According to the coordinator the cooperation between the partners and the people responsible at MSCA has been very friendly and supportive and they are very satisfied. The coordinator added that a welcome amendment was the introduction of better support for the hosting institutions. The coordinator had to deal with some issues like delays in the delivery of services or that financial reports were not submitted in time. But the coordinator thinks about this as something every project management has to deal with and that is not something specifically linked to MSCA. Also the research fellow did not experience a negative impact through administrative burdens.

Besides this, one issue that was mentioned in the interviews was the time frame of the project. All the stakeholders mentioned that they wished for more flexibility regarding the time. The research fellow for example would welcome the opportunity to extend the length of stay up to two years. The coordinator also mentioned the need for more flexibility in the time management as it is not possible to justify a longer stay of one or two months for a company if only a few days would be necessary. He explained that in the case of the necessity of acquiring a new technology a longer stay would be justified. But if there is already a given technology there they only have to discuss the implementation under real life circumstances a few days would be enough.

The partner added the requirement for more spatial mobility. Due to administrative restrictions it was not possible for them to move to other places in the country to establish a greater network or to participate in conferences outside of the countries of the partner institutions. This is a huge limitation to their work and the efficiency the project could have had.

Regarding the budget the coordinator is very satisfied and mentioned that no problems occurred until now. If further equipment is necessary they can deal with this issue through other funding. In his opinion the different institutions come together to share their resources. In contrast to this statement the partner institution mentioned that the budget is too low and that they have to co-finance a lot. This occurs especially in terms of travel costs. At least 4.000 Euro per month would have been required to cover all the expenses linked to traveling. The partner institution would furthermore welcome the opportunity to make secondments in companies. Another problem the partner institutions experienced was the transfer of cash to Argentina. Legal issues made it difficult for them to transfer the necessary money and they had to spend a lot of time on solving this problem.

A4.4.2.4 The delivery of the MSCA project

According to the coordinator there is not only one good way to build up a consortium and a lot depends on the institutions that are involved in the process. It is necessary to communicate the benefits to all partners of participation in a certain project. Otherwise it will be difficult to create a so called win-win situation. In the case of NANOREMOVAS the communication was about testing ways to satisfy the needs of possible future customers. Doing this under real life circumstances furthermore makes it possible to demonstrate new innovations to other partners and companies. The membership in the consortium was therefore driven by the question of how to create cooperative working packages and cooperative task managing. The two partner

institutions in Argentina for example already developed some technology for the removal of arsenic. Furthermore there exists already a strong Argentinian commitment in Europe. The coordinator describes the partnership as very fruitful and they just had to do one amendment due to the retirement of one Professor.

The recruitment for NANOREMOVAS went very smoothly. The partners knew each other already and were involved in the discussion about the involvement of each partner. This made it possible to create the right combination of different competences for the partnership. For a company like Innova BIC the participation in MSCA is comparable to an investment. The research fellow compared MSCA to an accelerator for the personal career.

Within RISE it was possible for the partner institutions and the research fellow to stay in Argentina and create valuable partnerships.

The training offered to the research fellow included workshops about Innovative applications of nanotechnology to water treatment, approaching Business Angels and Venture Capital in the water treatment sector, demonstration of the pilot plant and potential applications and Entrepreneurship and innovation management in the water treatment sector. The training was conducted by Innova BIC. For the research fellow the training was very valuable and since it was based on "learning by doing" it was some kind of education very close to real life circumstances. This generated real added-value compared to "academic-only" training. According to the partner institution some of the Argentinian researcher had problems to understand the concept of technology transfer, innovation, risk and business integrity but they will go on offering this kind of training.

A4.4.2.5 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

NANOREMOVAS follows an innovative transnational approach that brings together skills and expertise from different backgrounds. In the process they are using qualitative and quantitative methodology in the field of Environment, Nanotechnology and Engineering integration. The aim is to gather new knowledge about arsenic absorption mechanism and to publish the gained knowledge in technical journals. They also communicated their findings in international conferences and to standardization bodies.

This multidisciplinary methodological approach under real life circumstances helped to improve the research excellence and relevance of the research of all involved organisations. They already published three articles about Arsenate removal with superparamagnetic iron oxide nanoparticles on the website of Cordis (beforehand published in two different scientific journals).

All the shareholders think about this concept as something unique that can be rarely found in any other schemes. Furthermore the shareholders highlight the fact that the involved researchers do not just conduct their research in a laboratory but "on the ground". This has a deep impact on the quality and usability of the research outcomes. Furthermore the issues of the transfer of knowledge and the cooperation with the social surrounding is crucial. Therefore MSCA is a more than welcome programme with a deep impact.

Impacts on structured training and professional development programmes for researchers

The way the programme was set up (internationally, "very hands-on") institutions offering training (Innova BIC but also the Universidad autonoma de Barcelona) receive

feedback regarding their information about what works well and what does not. Ordinary training programmes are usually focusing on academic training. This made the training offers in NANOREMOVA somewhat special. The coordinator mentioned that fellows who had participated in the project in the past, often continued to work in companies and had corresponding experiences and links that researchers usually do not necessarily have. Training within a MSCA project does not only focus on the fundamental aspects of research but also gives the fellows a deep insight on the (working-)conditions of companies therefore the researcher gets an understanding of company specific issues. These also has a greater impact on industry-academia collaboration.

The research fellow also mentioned that she together with the partner institutions presented the model of training of MSCA at different conferences in Italy. The resonance was very positive and so MSCA has not only an impact on structured training within the institutions involved in MSCA but also in companies not associated with MSCA.

Impacts on international collaboration / networking / researcher mobility

An international collaboration generates more open-minded visions within organisations. Therefore MSCA helps to create mutual understanding and openness towards international cooperations. The plant actions in Argentina will also be a possibility for a demonstration to other partners and countries. If the people in other companies (not yet involved in MSCA) see that there is the opportunity to create a winning situation this will be very encouraging for them.

As a result, the partner institutions continued to look for partners in other countries to compare and improve the transfer of knowledge, skills and technology. All of these had been achieved and due to this they decided to write another proposal together with the coordinator for H2020.

Compared to other national schemes or bilateral agreements the dominating narrative is that MSCA has a greater impact as different actors from a lot of other countries are involved. The research fellow mentioned that mobility especially for a PhD is crucial. From her perspective, MSCA provides a one-of-a-kind experience in this sense. This is also the reason why the research fellow would have wished to extend her stay. The partner institution agreed to this. Unfortunately, administrative issues limited the possibilities to do so. Therefore, there were some limitations to realising this extended stay. The interviewees describe this as unfortunate since it would have increased the impact of the MSCA project even more.

Impacts on business-academia collaboration / knowledge transfer

The partner institution went into a MSCA project with the strategic aim to create new partnerships. According to the partner institution this was a successful endeavour. The partner institution developed partnerships with organisation in Spain that are located in Barcelona. They also invited colleagues from Sweden into a partnership on international activities thanks to the involvement in NANOREMOVAS. Furthermore they are looking forward to publish more articles together with their colleagues from Argentina about what they gained from the cooperation. In 2016 they already published an article about NANOREMOVAS as a model of university-industry cooperation in a international cooperation contest. In this article they wrote that "NANOREMOVAS inter-sectoral and multidisciplinary research requires [...] the exchange of best practices that are interacting with other markets and players by sharing resources and means, improving the communication between researchers from different disciplines. [...] complementary strengths of both sectors are combin[ed] to produce a high-quality outcome of the project (De Leo et al. 2016)".

Therefore participating in MSCA does not only make it possible to solve specific problems. It also helps to improve the overall capacity and competitiveness of the partners involved. Through papers and seminars and other methods it is possible to transfer the acquired knowledge into different organisations. The research fellow presented together with the partner institution the model of MSCA in conferences and new projects in Italy what clearly shows how highly appreciated this kind of model is. The feedback they have received was very positive too. Through the model of MSCA universities and research centres also change their idea of innovation what helps to improve future business-academia collaboration.

Unexpected impacts at organisational level

No unexpected effects were identified.

Impacts at the fellow / researcher level

The research fellow described her participation in the MSCA project as something very important to her in terms of skill evolution and career development. She was able to expand her contacts within the scientific community and abroad. She got the chance to speak to her colleagues from des Universidad Autonoma de Barcelona for example and compare their model of innovation with her own. Working in a MSCA project therefore had a great impact on her personal skills. In addition, she got immediately employed by one of the partner institutions after her involvement in the MSCA project. This makes it clear that MSCA had a positive effect on her career.

Impacts on researchers' skills

MSCA had a great impact on the skills of the research fellow. There have been three dimensions of skill improvement identified: technical skills, soft skills and business skills. Through the collaboration with other experts in the field of water treatment it was possible for the research fellow to exchange ideas and knowledge with them what had a good impact on the research fellows scientific expertise. Furthermore the research fellow gained valuable knowledge about new research centres and universities what improved the research fellows networking capacities in an international and intersectoral field.

The greatest impact of MSCA was in the area of knowledge about business and economics. The research fellow participated in a training about the concept of risk and marketing. This kind of training is not common within the scientific community. Participating in a MSCA project also changed her idea of innovation in a more practical way. Through the "learning by doing" training she received a deeper insight how different organisations work and what they are aiming to achieve. It was also the first time the research fellow came in contact with the issue of venture capital what gave her an idea about the reasons and functionality of venture capital.

Impacts on researchers' careers

In the concrete case of NANOREMOVAS, MSCA project seems to fulfill the aim of supporting the career development of the research fellow. The international and intersectoral cooperation gave the research fellow useful experiences how to discover new EU projects. This ability to identify and source funds from EU projects was useful for her career, since it is a clear plus in the skill set when applying for a new job.

Furthermore she got experiences about how other organisations work and what they do. Additionally she got an idea of how Venture Capital functions. Combined with the ability to come together with different actors and to participate together in international conferences these skills are very helpful to develop the personal career. With these she got new opportunities to join forces to write papers and/or to publish in books or journals.

In the project the research fellow was confronted with a lot of new topics (i.e. business) that are usually not a part of the scientific education. This gives her a great advance compared to her colleagues that were not involved in a MSCA project. She also gained new soft skills (i.e. networking capacities) that improved her chances in the labour market. The boost of the soft skills is also a motivation of the partner institutions to send their employees to a MSCA project.

As a result the research fellow became employed at one of the partner institutions. This was a great success for her and brought her career significantly forward. Therefore the research fellow stated that MSCA “can change and improve the idea of career development. It is an extra experience you can rarely find. One can compare it to the job of an accelerator that improves the performance and adds new values to your skills”.

Unexpected impacts at researcher level

No unexpected impacts at researcher level were described by the interviewees

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A4.4.3 RISE case study - EnviCOP

For this case study draft, two interviews were conducted:

- one with the coordinator of the action (who was also a fellow),
- one with the coordinator of the Portuguese partner university.
- one with an ESR fellow that went abroad twice (from IT to the US).

A4.4.3.1 Introduction to the MSCA project

Overview of MSCA project

Name of project	EnviCOP
Name / type of the coordinator	Seconda Università Degli Studi Di Napoli (University, Italy)
Name of Action	RISE/IRSES
Introduction to project	<p>EnviCOP supported researcher exchanges and workshops between scientific institutions in Brazil, the EU and the United States. The work focused on promoting environmentally friendly coastal management. The ENVICOP (Environmentally friendly coastal protection in a changing climate) project was an International Research Staff Exchange Scheme (IRSES) that facilitated collaboration in soft coastal management research. This involved the secondment of 22 early-stage researchers and 11 experienced researchers.</p> <p>EnviCOP intended to strengthen the research activities on advanced numerical and physical models and tools to forecast short- and long-term phenomena with respect to coastal protection in a changing climate.</p> <p>Furthermore, the project aimed to introduce new and improved environmentally friendly coastal protection structures and to serve decision makers in coastal regions. Lastly, coastal communities were to be supported to adapt to climate change, e.g. by strengthening emergency planning arrangements, improving co-ordination of coastal erosion or manage the investment of significant levels of public funding.</p>
Names / types of all other partners	<p>Seconda Università Degli Studi Di Napoli (SUN), Italy University Politecnica Delle Marche (UNIVPM), Italy Politecnico Di Milano (POLIMI), Italy Universidade Do Porto (FEUP), Portugal Black Sea – Danube Coastal Association For Research And Development (BDCA), Bulgaria Scripps Institution Of Oceanography (SIO), US University Of Vale Do Itajaí (UNIVALI), Brazil</p> <p>All partners were universities or research institutes.</p>

Name of project	EnviCOP
Narrative on participating partners	<p>The universities and research institutes participating are all active in the research area of coastal protection. The overall project logic was to enable exchanges of researchers from the EU partners to the Scripps Institution of Oceanography in the US and the University of Vale do Itajaí in Brazil.</p> <p>The project was coordinated by DICDEA, the Department of Civil Engineering, Design, Construction and Environment of the Seconda Università Degli Studi Di Napoli. Especially the Scripps Institution of Oceanography is one of the leading research organisations in the area of coastal engineering in the world. The University Of Vale Do Itajaí, Brazil, was an interesting exchange partner especially for the Portuguese Department of Civil Engineering of the Universidad Do Porto.</p> <p>The structure of the partners participating followed largely the networks of the European partners involved. Most of the partners were already known to the European partners before, but they have not collaborated on such a structured basis before. The project did not receive Marie Curie funding in the past.</p>
Narrative on participating fellows	<p>Overall, the project allowed 27 fellows to participate in an exchange, of which 16 were early-stage researchers and 11 were experienced researchers. In total, the 27 fellows participated in 109 exchanges.</p> <p>The fellows consisted of team members of the participating departments and were employed by the participating organisations. early-stage researchers were either MA- or PhD-students, while experienced researchers were mainly professors or senior researcher.</p>
Project budget (EUR)	<p>EU funding amount: EUR193 200</p> <p>Total project budget: EUR227 200</p>
Start and finish date of project	May 2012 to April 2014

A4.4.3.2 Rationale and added value of the MSCA project

Rationale for the project and participant motivations

In the view of both the coordinating university and the partner university, the main motivation to participate was economical: to receive funding to enable their researchers to visit the US and the Brazilian partner as research fellows (and vice versa).

The wider aim of both organisations formulated was to strengthen overall networks with the third-country partners, collaborate in research projects and to learn from the methods developed and applied there. The European partners were interested in the technical coastal monitoring system using low-cost buoys that was set up by the US partner and in the numerical/scientific models of coastal areas and developments that were researched by the Brazilian partner.

There were no businesses involved in the project.

The Italian partner viewed the overall budget allocations as sufficient. For the Portuguese partner, the budget was also viewed as sufficient although they expected the exchanges to be cheaper than they actually were. During the project, it turned out that the costs to go abroad and live abroad were higher than expected. Therefore, only a smaller number of exchanges could be realised in the end.

For the researchers, the transnational element was of high importance and the main reason why to engage in the project. To participate in a MSCA project was seen as a chance to participate in a relatively expensive research exchange with a U.S. institute of high reputation and unique methodological knowledge.

The added value of MSCA funding

In the view of the coordinating organisation, for all Italian universities, most of the travelling to the US would not have been possible without the MSCA funding. According to the Portuguese partner it would not have been possible to realise research collaboration on that scale – only a few of the exchanges could have been realised at best. This was assessed to be even more the case for the partner from Bulgaria.

At the time the application for the project was drafted (i.e. ca. five years ago) to the knowledge of the coordinator, there was no alternative way to support this number of exchanges either on national or international level. Therefore, without the MSCA funding, there would have been much fewer exchanges. They might have found some US or Italian support to realise some of the exchanges, but only on a smaller scale.

Within Europe, mobility would have been possible anyway. The Italian coordinating Universities would have most likely found a way to enable cooperation with the Bulgarian and Portuguese partner – they did it before the project and are still organising cooperation after the project. Travelling costs are much lower within Europe.

As the partner university was approached by the coordinator, they did not specifically research alternative sources of funding beforehand. To the knowledge of the Portuguese partner, there is nothing comparable on a national level to enable similar kind of mobilities. National funding usually targets only national organisations – the transnational element, i.e. the opportunity to visit the US and Brazilian partner for collaborative research and to receive fellows from the US and Brazil – was of high importance to the project and to the Portuguese Partner. Both overseas partners were of scientific interest, as in the US, they had specific expertise in coastal monitoring and in Brazil, they had expertise in numerical/scientific models of coastal areas and developments.

Without the MSCA funding, at best, the research stays would have been much shorter or not possible at all. For the researchers participating, the MSCA project was a unique opportunity to set up research exchanges with the partners abroad and on the achieved scale (in terms of numbers and length of exchanges). Researchers found no alternatives to MSCA funding opportunities.

The set-up and administration of the MSCA project were described as overall simple and resource-friendly, both by the participating organisations and also in the opinion of their units responsible for project administration – especially in comparison with other European funding. Fellows also experienced the administrative burden as overall manageable.

The project largely followed the networks of the partner universities involved, both in Europe and in the US and Brazil. For the Portuguese partner, e.g., 50% of the partner organisations were new. Therefore, the process of establishing the consortium was described as simple and effortless.

Overall, both partners did not see possibilities to decrease the administrative burden from the EU side. On the level of the universities, in some cases, the administration was more complicated in comparison to other universities.

Project partners had not received MSCA funding before.

A4.4.3.3 The delivery of the MSCA project

As stated before, the project aimed to enable the researchers of the partner organisations to visit the US and the Brazilian partner as research fellows (and vice versa).

Thematically, the project focused on 5 major research topics:

1. Sea-level rise and Hydrodynamics of Coastal Zone
2. Dune erosion protection & Shoreline management
3. Artificial Reefs & Beach nourishment
4. Beach Drainage system as a littoral stabilization
5. Coastal protection combined with Wave energy utilisation

During the project, the exchange of researchers was the main tool to provide the exchange of knowledge and experience, and to perform planned project activities. In the course of the project, 89 person/months of research exchanges were realised. The exchange involved:

- The secondment of 22 Early Stage Researchers (ESR): 5 from BDCA, 4 from FEUP, 3 from POLIMI, 1 from SUN, 1 from UNIVPM, 8 from UNIVALI.
- The secondment of 11 Experienced Researcher (ER): 3 from BDCA, 1 from POLIMI, 2 from SUN, 2 from UNIVPM, 1 from SIO, 2 UNIVALI.
- besides the above mentioned, another 5 ESR and 3 ER took part in joint research seminars.

Secondment of researchers has been realized in both directions from EU to Brazil and US and vice versa:

- From EU to US: 5 ESR (total 11 p/m) and 5 ER (total 10 p/m) for a total of 21 p/m
- From EU to Brazil: 10 ESR (total 28 p/m) and 6 ER (total 13 p/m) for a total of 41 p/m
- From US to EU: 1 ER (total 6 p/m)
- From Brazil to EU: 8 ESR (total 19 p/m) and 2 ER (total 8 p/m) for a total of 27 p/m

In the course of the project, six Workshop meetings and five Joint Research Seminars were held. The Books of Proceedings of the research seminars have been distributed among all Partners and other concerned individuals and organisations.

The EnviCOP main results could be summarise as follow:

- Strengthen research partnerships between the above organizations, primarily through short period staff exchanges Early Stage Researchers (ESR) and Experienced Researchers (ER), focusing the research activities on advanced numerical and physical model tools to forecast short- and long-term phenomena with respect to coastal protection in a changing climate.

- Provide improved process understanding, new knowledge, improved numerical and physical model tools, resulting in introducing new and improved environmentally friendly coastal protection structures.
- Serve finally decision makers in strengthening emergency planning arrangements, improving co-ordination of coastal erosion and surface water flood risk; managing the investment of significant levels of public funding, and helping coastal communities adapt to climate change.
- New research findings have been received, and reported at the Research seminars
- 12 joint scientific papers have been published/submitted, others are underway (to be published in 2015-2016). The project was also acknowledged in another 14 papers, involving co-authors among the ENVICOP research team.
- 6 books of proceedings with presentations at the research seminars have been printed out and disseminated among project partners and other concerned parties.²⁶⁹

There was no structural training / professional development undertaken within the project. However, the project allowed ESR fellows to work with more senior researchers and achieved a training effect by that.

There were three minor difficulties encountered by the project:

- The secondments to the US were more expensive than foreseen.
- The efforts undertaken by the partners to integrate newly arrived researchers varied. In some cases, clearer responsibilities in regard to which person acts as a contact point or who provides initial orientation could have helped.
- For some partners, it was not initially clear that only fellows employed by the partner were eligible to receive funding.
- In the cases of the two partners interviewed, the recruitment of the fellows followed mostly the organisational units of the participating partners, e.g. the staff of the department units had the chance to go abroad. There was no structured recruitment process for fellows (or partners, see above).

A4.4.3.4 Impacts of the MSCA project

Impacts at the organisational level

Impacts on research excellence

The coordination of the MSCA project had an impact on the universities' ability to undertake high quality research. This was because first, the collaboration especially with the excellent and high profile US partner allowed research of higher visibility and quality. The impact was especially strong for the early-stage researchers and their training.

With the MSCA funding, the participating partners mostly followed their research interests they already had before, but were able to identify the most relevant future areas of research. During the MSCA funded exchanges, the partners were discussing various coastal protection issues. At the end, in these meetings, it became clear that coastal monitoring was the most important point to solve and they followed up on that topic ever since.

²⁶⁹ See mostly http://cordis.europa.eu/result/rcn/171482_en.html and <http://cordis.europa.eu/docs/results/295/295162/final1-envicop-final-meeting-overview-dv.pdf>.

With the US partner, the coordinating university was able to successfully apply for several other projects (see also business-academia collaboration below) and also publish together.

Impacts on structured training and professional development programmes for researchers

There were no impacts, as no structured training and professional development programmes have been provided by the project.

Impacts on international collaboration / networking / researcher mobility

Overall, the participation affected the partners' ability to work with the organisations in third countries during the project, as without the funding, research collaboration on that scale would not have been possible (especially to the partners from widening countries).

There is only a small impact on the degree to which the organisations collaborate and network internationally today. The coordinating university does not collaborate more often than they would have without the MSCA funding. This is mostly because the partners knew each other before, they cooperated before, and they will cooperate in the future and also had done so without the funding, just on a smaller scale.

After the project, the coordinating university and the partner university stopped collaborating with the Brazilian partner on a structural basis. In principle, both could still build up on their experiences made in the MSCA project and cooperate again in the future, but there are no specific plans to do so.

However, due to the MSCA funding, both universities were able to collaborate more intensively during the project and were also able to collaborate better. That did not impact on the general ability or willingness to collaborate on an international level in principle.

The MSCA project did not lead to any collaboration or participation in other EU initiatives with an international dimension. Even though it is always good to be able to show a MSCA project in a CV for reference, in the experience of the coordinating partner, it is not the case that somebody new would call now because of that project to initialise another project on international level.

Impacts on business-academia collaboration / knowledge transfer

Even though there was no business-academia collaboration within the project, it is likely that the research undertaken in the course of the project will lead to the involvement of business partner in the future, e.g. in the further development and testing of a coastal monitoring system.

In the period when the coordinator himself was in the US, they were able to develop a new system to measure light coastal waves with a GPS-low-cost-system. Usually, a wave buoy costs between EUR40-60k. The low-cost system developed in collaboration costs only EUR1k per buoy. This technology was developed together during a research stay in the US, and the coordinating university and the US partner installed the system in different places to test it. At the moment, they are applying for instance to implement an all Italian wave measurement system. They also applied for an early warning system for Italian harbours.

In the end, the device will be tested and completed – they already almost completed all the tests successfully and they plan to patent the system in the future.

Unexpected impacts at organisational level

According to the partner universities interviewed, there were no unexpected impacts at organisational level.

Impacts at the fellow / researcher level

Impacts on researchers' skills

In the opinion of the Portuguese partner, the overall impacts on the researchers' skills differed by level of seniority. In regard to skills, the exchange was most beneficial to PhD students and MA students (ESR), while more senior staff (ER) mostly got insight into how partners work and where their focus lied and overall developed their networks.

In general, the younger/more early-stage the researcher, the more he or she can learn abroad. All of them benefitted from the chance to go abroad, be it by being included in the collaborative research abroad or by the need to find orientation in an overall foreign environment. By being involved in the research projects, the PhD researcher and the MA students get to work with more senior scientists, also with the key staff from the US and Brazilian partner abroad. A fellow reported e.g. that due to the funding, it was possible to meet e.g. a senior colleague abroad that does not travel anymore.

The PhD students were already in the end of their PhD projects. With their better background, they were overall able to learn about more advanced techniques – it was a good experience to learn e.g. about the state-of-the-art coastal monitoring techniques and a good opportunity to see how those more advanced techniques are applied e.g. by the US partner. They also increased their knowledge about the management of research projects.

A fellow interviewed pointed out that not only the coastal monitoring processes were interesting to follow, but it was also very beneficial to learn how to manage and analyse the data produced by the monitoring. Furthermore, there was a chance to participate in the calibration of the monitoring instruments, which was a unique experience and an important learning possibility.

For the MA students, as they just had finished their BA/graduations, it was already a step up to be involved in the research projects, albeit not on such an advanced level as the PhD students were involved. They learned more about first-level research and technical aspects of the project and less about project management. For them, it was good to get into the networks, to get a feeling for a research project, to make some real work in the field, but more basic. It was not possible to involve them in more complicated issues as they do not have the background of that. In the end, the MA students were also involved in the writing of scientific papers, which was often the first time they got in touch with this aspect of scientific work.

Impacts on researchers' careers

In the view of the interviewee, the most important impact of the funding on the researchers' careers was that the fellows were able to show their research stay and the papers written during the project in their CV.

For the PhD- and MA-students that were sent or received, being at the beginning of their career, this was the first step for them to develop scientific networks with colleagues from abroad. The fellows were able to use these networks e.g. to write scientific papers together.

A ESR fellow indicated that the MSCA funding helped them to be accepted by a PhD-programme at another university. Unique skills like learning how to calibrate a research instrument were expected to be of future benefit to the career.

For senior staff that were e.g. full professors at the time of the project, there was no real impact on the careers besides being able to collaborate with the partners abroad better during the project and in the time future. At the moment, the participating

organisations continue to collaborate with some of the partners abroad. With other partners, it is possible that collaboration will be renewed in the future, although there are no concrete plans.

Unexpected impacts at researcher level

According to the researchers interviewed, there were no unexpected impacts at researcher level.

A4.5 NIGHT case studies

A4.5.1 NIGHT case study – Illuminale Trier (Germany)

A4.5.1.1 Introduction to the NIGHT project

The European Researchers' Night event in Trier took place on 30 September 2016 in the City centre of Trier. It was organised jointly by the University of Trier (Universität Trier) and Trier University of Applied Sciences (Hochschule Trier).

The project's theme was "knowledge enlightens" [Wissen schafft Licht] and combined events related to the scientific activities of the two higher education institutions with artistic light installations (colourful projections onto buildings).

The main descriptive features of the project are as follows:

- Name of the project: City Campus meets Illuminale [City Campus trifft Illuminale]
- Name of the coordinator: Dr. Christel Egner-Duppich, Head of department of EU affairs, Trier University, working closely with her counterparts at Trier University of Applied Sciences
- Budget: approx. EUR171,000 for two years (2016/2017)

This is the third time the Illuminale has been organised, 2012 with MSCA NIGHT funding, 2014 without.

The two participating higher education institutions (University of Trier and Trier University of Applied Sciences) are both located outside of the city of Trier, which, the coordinator indicated, leads to low levels of interaction between the general public and the institutions' researchers. The project coordinator therefore considered researchers' presentation of their research to the public – preferably applied to a daily life context – as the most important aim of the event. This interaction is a two way process, according to the coordinator: the public learns about researchers' research and its relevance, and the scientists take away new impetus from the questions of the public. At the regional level, it is also considered an opportunity for the two universities to present politicians the added value of having (and financing) higher education institutions, and to show that their research is relevant and that tax payers are interested in their work.

The short term interaction between researchers and the general public during the researchers' NIGHT is also seen as an opportunity for the region's youth to get informed about the wide range of study programmes that is offered by the two institutions and to make visitors curious about research in general. Raising interest in research careers is a secondary, or indirect, aim of the event. The coordinator believes that the format of the event is suited to convey the interesting aspects of a profession or a field of research which may raise interest of visitors who have not yet known these before.

A4.5.1.2 Set-up and added value

Administration of the NIGHT project

The coordinator stated not to have experienced difficulties with the application process and reporting requirements. It needs to be noted, however, that writing and advising on applications for EU funding is one of her main tasks for the university. She has also been an evaluator for the European Commission Horizon 2020 Secure Societies programme.

In case of questions during the application process, the coordinator reported to have quickly received very good answers from REA. She had also participated in an information event in Brussels which she considers to have been very useful.

The deadlines involved in the application and reporting process were perceived as reasonable and manageable.

The coordinator appreciated that the time between close of applications and receipt of approval or rejection has improved substantially over the past years, which has improved planning security.

On a different note, the coordinator would appreciate a mechanism for sharing experiences with organisers of other events in the framework of the European Researchers' Night. Currently, organisers of events do not have the possibility to learn from each other due to the simultaneity of the events.

The added value of NIGHT funding

The NIGHT funding accounts for 40% of the project's costs. The remaining funding comes from a variety of regional and state level foundations, the university, sponsoring, revenues from advertisements (which covered the costs of printing event brochures), and revenues from selling licences to catering providers.

The EC funding is important for the organisers in two ways:

- Firstly, it provides the opportunity to organise a large event. In 2014, when NIGHT funding was rejected, the event took still place but on a smaller scale.
- Secondly, it is a good funding base to start from when looking for additional funding. It sends the signal to other potential funders that the project is backed by a larger funder and that the event is likely to be successfully implemented. The coordinator also stated that the European dimension of the event – events taking place at the same time in various European cities – is a positive argument when trying to attract other funders.

A4.5.1.3 The delivery of the NIGHT project

Overview of project delivery

The two higher education institutions organising the event are located outside the centre of Trier and one of the main purposes of the event was to bring research and its findings to where it is most easily accessible to people – the city centre. Activities, presentations and events took place at various locations in the city centre, but all within a few walking minutes from each other. Each location had its own theme with clusters of similar topics/fields which gave the event a general structure for orientation. These were:

- The Viehmarktplatz, a large square in the city centre where a market takes place twice weekly. Taking a market as inspiration, several dozens of tents and stalls were set up where researchers presented their research (the "science market"). In addition, a stage offered an entertainment programme throughout the evening.
 - Examples of topics presented: "Mexiko, more than beach, cactus and tequila"; "The bee project of the University of Trier".
- The Roman thermal bath at the Viehmarktplatz. This thermal bath (or the ruins thereof) is usually not accessible for free and during the Illuminale hosted several podium discussions on research but also daily politics.
 - Examples of topics presented: "What stones can tell us"; "Augmented Reality: Visiting the ancient world with your smartphone".

- The Augustinerhof, a square a five minute walk from the larger Viehmarkt, had several stands showing new technological developments, including an electric car prototype developed by the university. The square also offered places to sit and the opportunity to buy snacks and drinks.
 - Example of topics presented: "Be an e3-mail" (for kids); "Team Protron: why students from Trier build the best electrical car".
- The Townhall, on the western side of the Augustinerhof square, hosted several discussions and presentations on a wide range of topics concerning research, politics and the society in general.
 - Examples of topics presented: "Karl Marx in China"; "A hacking attack: a live presentation".
- The Trier Theatre, on the northern side of the Augustinerhof square, where science was transformed into art and entertainment on several stages.
 - Example topics: "4000 years of love: love songs from the old Egypt to today"; "Russian lyric poetry today".
- The Humboldt Gymnasium (high school), on the eastern side of the Augustinerhof square, where interactive presentations of researchers were held;
 - Example of topics presented: "Test your knowledge: mental illnesses and psychotherapy"; "Pupils test STEM".
- The Volksbank Trier, where 3-D technologies and the possibilities related to them were presented.
 - Examples of topics presented: "3D-BodyScan and 3D-Print"; "The potential of 3D printing".

Presentation took various formats, from small experiments or the opportunity to test tools, to video presentations, artistic performances and podium discussions.

The presenting researchers change with every Illuminale. For the 2016 Illuminale, an internal call for interest in presenting at the event was launched in the two higher education institutions. According to the coordinator, this resulted in a good response from all fields of research. In addition, for some projects which were considered particularly interesting/suitable for presentation, responsible researchers were contacted directly by the organisers.

Researchers were responsible for what was presented and how it was presented. The organisers admit that researchers usually find it difficult to deviate from the standard format of presentation in their discipline, mostly lecture-like presentations supported by posters. Researchers therefore received a briefing by the event organisers on some common framework parameters and things to consider. For example, researchers were told that presentations should not be longer than 15 minutes, that they should be as interactive as possible, that researchers should position themselves approachable in the room and should take the initiative to get into discussion with visitors. It was also recommended by the organisers that researchers should wear name tags and have give-aways.

Assessment of delivery

The event was delivered as conceptualised – as a large, well organised, informative and entertaining event embedded in a nice, unhurried atmosphere supported by colourful light installations. The topics covered were so diverse that every visitor could find something matching his or her interest, and even without specific interest in

research in general or particular presentations, the atmosphere invited for a stroll, as normally on a Friday night the squares would be empty (the Augustinerhof normally is a parking space) and some of the participating buildings would be closed to the public normally (e.g. the Thermal bath and the school). The light installation also contributed to the nice atmosphere.

Despite the cold weather and the rain earlier in the day, the event attracted a large number of visitors, in particular in the evening after sunset when the light installations started. There were continuous streams of people entering and leaving the several locations.

At all locations, most of the presentations were quite standard and passive, taking the form of poster presentations of research projects in combination with researchers replying to answers by visitors, or even short lectures. Some researchers also encouraged visitors to test (technical) tools, but these were few: visitors of the Humboldt Gymnasium were able to test a scanner that was used to read the shape of skulls into a software in order to measure it and estimate a correlation of certain measurements and sicknesses; at the Augustinerhof, the faculty of mathematics had installed a computer game where visitors had to press a random sequence of 0 and 1 and where the computer was trying to predict what the visitor would press next.

The most interactive activities were activities targeted to children (e.g. playing e-mail and walking with a message from sender to receiver, handicraft workshops). As alluded to above, the atmosphere therefore can be best described as informative – in a pleasant but passive manner – rather than exciting or interactive.

The event succeeded in attracting a diverse audience. Until late at night, visitors of all ages were present from small children, teenagers, and young couples to families, older couples and seniors.

A4.5.1.4 Impacts of the NIGHT project

Impacts at the organisational level

The organisers already had a very clear idea before the 2016 participation in the MSCA NIGHT action of their role and responsibility in terms of disseminating research findings to the general public and taking up concerns and ideas from interested citizens. The event was first funded by MSCA in 2012 (in 2014 it was not funded by MSCA resources) and even before that, the university already organised small “Science on the hill” (due to the university’s location outside the city) events with similar objectives. These however, were smaller in scale and only attracted a very interested, dedicated audience because of the effort it takes to drive out to the university campus. The opportunity to up-scale these earlier type of events and to reach a broader audience was the motivation to apply for MSCA funding. Various smaller, more specific dissemination events are being held at the campus in addition to the Illuminale throughout the year, often restricted to particular departments or researchers.

The coordinator was not able to confirm that the Illuminale has changed the way researchers work or disseminate their work at the institutions involved. However, the coordinator notes that this event certainly forces researchers to think about how to present their research and its findings to a non-scientific audience with regard to ensuring comprehensibility and awakening interest. According to the coordinator, one of the main advantages of this type of event is that visitors’ questions and reactions provide researchers with stimuli regarding the relevance of their research to the general public.

Impacts at the participant level

With regard to the impact of the event on visitors, the coordinator adopts a pragmatic, realistic approach. The coordinator finds it unlikely that people will change their mind about the value of research or make plans about a career in research just because of having visited the event. On the other hand, it cannot be excluded that visiting such an event provides important information or stimuli that have an affect further down the line. For example, with regard to the impact of the event on awakening young visitors' interest in the research profession, the coordinator states that researchers' may raise interest in a particular topic. Interest in a particular topic, if maintained, may then later develop into the desire to study and even research this topic. Presenting the advantages of the research profession without its relation to a particular topic is judged to be difficult during such an event by the coordinator.

The rather subtle potential effect of the event on individuals' perception of research and the research profession is supported by the interviews conducted with a small group of visitors. The group of interviewees was quite diverse in their view of research and research careers, ranging from no particular interest in research and research careers, to a high interest, to concrete plans of pursuing a research career. None of them thought that they had changed their view of research or a research career as a result of having attended the event, but all of them had overall enjoyed the presentations they had seen so far.

A4.5.2 NIGHT case study – Researchers, moving Europe forward. Meet them, join them! (Spain)

A4.5.2.1 Introduction to the NIGHT project

The project presented to the call on the European Researchers' Night is called Researchers, moving Europe forward. Meet them, join them! It covers the period from May 2016 to December 2017.

It is promoted by the government of the Autonomous Community (region) of Madrid, concretely, by its department of education, youth and sport. The coordinator is the Foundation for Knowledge madri+d (Fundación para el Conocimiento madri+d). The total budget of the project is EUR223 975.50 and the EU contribution is EUR200 000.

In 2016, the activities took place on 30 September. The Foundation madri+d partnered with 25 entities including higher education institutions, research institutes, scientific associations, and other public institutions involved in the promotion and dissemination of science.

The European Night of Researchers (the Night) was introduced in Madrid in 2010 as a result of the MSCA funding initiative.

The coordinator considers that the dissemination of science is the main motivation of the initiative. The initiative's objectives are:

- Introduce researchers to citizens, so that the latter get to know research work and the benefits of research to society;
- Eliminate anachronistic stereotypes about researchers;
- Promote the choice of a scientific career among students;
- Promote an entrepreneurial mind-set among young people.

The 2016 event targeted the general public. Some of the activities targeted children and families, young people, or students at different education levels.

A4.5.2.2 Set-up and added value

Administration of the NIGHT project

The coordinator indicated that they were satisfied with the **process of applying for funding**, and has not experienced any issues in the submission of proposals. In particular, they highlighted the valuable role of the contact point at the European Commission. All the questions or issues the coordinator had on the submission procedure were timely and efficiently clarified by the contact point.

As for the **post-approval administration**, the coordinator encountered some technical issues when using the new management platform of Horizon 2020 in year 2014-2015. The team has not yet used the platform this year.

Until now, the coordinator has not experienced any difficulties to meet the deadlines established to justify expenses. This year, deadlines have been pushed forward. The justification phase has not yet started so the coordinator is not yet in the position to comment on this.

The added value of NIGHT funding

The initiative was first developed with MSCA funding in 2010. It has received EU funding every year since then, except in 2011. In 2011 it received funds from a

national public institution, the Spanish Foundation for Science and Technology, to compensate for the lack of EU funding.²⁷⁰ However, it is not possible to know whether the coordinator would find national funds for the initiative if this was not to be funded by the EU again in the future.

The coordinator is also in charge of organising the Madrid's Science Week, a yearly event organised since 2001 that takes place in November and lasts for two weeks. When compared to the Night, Madrid's Science Week event is more focused on opening up institutions to the general public and is less focused on the researcher. It involves more than one thousand activities and it is sponsored by a commercial bank.

In addition to the focus on researchers, the main added value of the Night is its European scope. According to the coordinator, the fact that the event is simultaneously taking place at different places in Europe, increases its attractiveness for the general public and the media.

Current national funding focuses on the allocation of personnel to the initiative. In the months previous to the event, national authorities allocate one person full-time for the coordination of the Night activities. Beyond that period, they have two people involved in the initiative on a part-time basis, including the national contact point for the MSC actions at the ministry of economy and competition, and a person at the Foundation Madri+d.²⁷¹

The coordinator has the support of national public and private entities which contribute to the event by developing activities (see partners above), or providing venues for the activities and advertising spaces free of charge.²⁷²

There is no additional funding for the initiative.

A4.5.2.3 The delivery of the NIGHT project

Overview of project delivery

The 2016 European Researchers' Night in Madrid included 36 activities supported by MSCA funding, plus five additional activities. The Night was preceded by an informative day on MSCA, and a 'meet the fellows' activity on 22 April 2016. All the activities were free for participants.

Night activities took place in multiple venues and municipalities in the region of Madrid. The coordinator contacted their network of universities and research centres, and invited the different institutions to propose activities.

The **type of activities** delivered was varied:

- 'Meet the fellow' and 'meet the researcher' 'speed dating' type activities.
- Demonstrations and workshops, e.g. on 3D printing, blueprints, bio-chemistry experiments, radio broadcasting, cooking, forensic chemistry, etc.
- Lectures, e.g. on the food industry, the "Gas and Dust from the Stars to the Laboratory: Exploring the NANOCOSMOS", etc.

²⁷⁰ The Spanish Foundation for Science and Technology is a public foundation under the Ministry of Economy and Competition.

²⁷¹ Contact details available at: <http://www.eshorizonte2020.es/ciencia-excelente/acciones-marie-sklodowska-curie/contacto>

²⁷² In 2016 it had the support of: Municipality of Madrid, Telefonica Foundation, Cervantes Institute, Metro of Madrid, Museum of Railways, Royal Botanic Garden Juan Carlos I – University of Alcalá, Students' Residence.

- Exhibitions, e.g. on the works of arts related to the history of the Centre of Social and Human Sciences.
- Visits to research centres, laboratories, medical facilities, and museums e.g. to see the Stardust machine, the railway museum, an operating room.
- Night at the museum of natural sciences (for children and families).
- Life performances, including theatre performances and a concert.
- Food tastings following lectures and workshops.
- Contest and prize delivery: prize delivery of the 1st contest of poetry and science for young students of the Community of Madrid', organised by the Foundation Madri+d.
- Stalls, including the 'European corner' offering information about EU support programmes to researchers, and a stall from the Foundation Women for Africa showcasing the biographies of African women researchers supported by the foundation.

The type of activities prepared for the Night depend on the regular activities of the participating organisations, their facilities, and equipment. For instance, the Spanish Institute of Oceanography visited by ICF, does not have an auditorium or large rooms available. As such, it can only receive small groups of visitors. The activities developed included a small exhibition, and several consecutive workshops for three groups of children and their families.

The coordinator also mentioned their efforts to find a balance between activities that allow for direct contact with researchers, and activities that allow for larger audiences (e.g. lectures). It explained that some activities cannot have a high number of participants as this would contradict the purpose of the event: approaching researchers to citizens (e.g. 'meet the fellow' activities). However, activities involving a higher number of participants are needed to comply with MSCA requirements on the total number of participants.

The event covered a variety of topics from different disciplines, including natural, social and formal sciences. In particular, it included a few activities about nutrition and the food industry to celebrate the International Year of Pulses.

Most activities were distinguishable from 'standing activities' of venues. Research centres and universities do not often open their doors and organise dissemination events for non-specialised public. For instance, the Spanish Institute of Oceanography does not usually organise events for children, and did not have an exhibition room before they got involved in the Night (see below). Some of the partner institutions develop similar activities in Madrid's Science Week, or other dissemination events held in the country.

Assessment of delivery

The ICF research team attended three activities.

Building a robot-fish. Fishes play hide and seek. Exploring the seabed.

Organised by the Spanish Institute of Oceanography, this activity included several workshops for children of the following age groups: 8-14; 3-7; 14 and over. The activities were adapted to the target groups and built on the work done in previous editions of Night. For instance, in 2016 the institute added aquariums in the exhibition room to respond to the comments of children from previous years who wanted to see living fishes.

ICF accompanied a first group of 12 children during the visit to the exhibition and the workshop 'building a robot fish'. The activities were participative and interactive. The director of the institute accompanied the children in the exhibition and answered their questions about sea species and the seabed. This activity was followed by a presentation on the work of the research institute, and the use of technologies for sea research. During the workshop, each child, accompanied by an adult, had to build a robot fish. A researcher from the institute gave the instructions and supported the group during the workshop.

Most of the children mentioned that they had not been to any similar event in the past. They expressed satisfaction with the activities. Some highlighted the more technical aspects of it (building a robot), while others referred to the theme (science, animals, sea). Some of the children (and accompanying adults) showed some frustration at some point due to difficulties in building the device. The researcher from the institute gave a more personalised support when needed and by the end of the activity all the children had finished their robot fish and could test it to make sure it worked properly before taking it home.

Organisers mentioned that the funding received had only covered the costs of the materials used in the workshops. The Institute had covered the rest of the costs. In particular, bringing the living fishes from their units in the coast of Spain had been quite expensive. The exhibition room is now permanent at the Institute.

The organiser also referred to limited human resources' capacity to organise such activities.

Researchers at enterprises. European corner.

The Foundation Madrid organised several activities, including an exhibition on research by enterprises; talks with MSCA fellows; a discussion on poetry and science; and the prize delivery of the '1st contest of poetry and science for young students of the Community of Madrid'. The activities targeted the general public, and the contest was open to the students from the last year of lower secondary and from upper secondary education from the region of Madrid.

ICF observed the discussions with researchers and the prize delivery. The prize delivery had approximately 80 attendees and included the reading of the winning poems by the authors. According to the coordinator, the contest had been a success and schools had asked if it would be held again in the future.

The talks with researchers were held in two rooms with different materials to make demonstrations. The level of interactivity was very high as participants had the opportunity to discuss with the researchers. Adults and children were also invited to do some experiments.

There were different profiles of participants including general public, students that had been advised by their teachers to attend (participation in the activity would be taken into account in their marks), and students looking for information on future career. Some participants referred to their previous interest in science and research, while others had come across the activity by chance.

Most interviewed participants reported that they were satisfied with the activity. They particularly liked the practical approach, the experiments, some of the material presented (e.g. 3D print of heart), and the way of explaining research to make it understandable to everyone. Some participants had already attended similar activities during Madrid's Science Week, or guidance activities organised by schools.

Feeding the night

Organised by the National University of Distance Learning, the event targeted the general public and included five short lectures on different aspects of the food industry (use of pesticides, food waste, etc.).

The event gathered university professors in different disciplines (bio-chemistry, health, anthropology), and a speaker from the civil society reporting on a local pilot on composting. Professors referred to their research work on the topic. The event also included organic food tasting and an activity where participants were invited to prepare a pot with an edible plant that they could take home.

The level of interactivity during the lectures was low due to time restrictions. Participants had the opportunity to discuss during the break for the food tasting and planting activity. The number of attendees was high (around 100) and many remained until the end of the event.

A4.5.2.4 Impacts of the NIGHT project

Impacts at the organisational level

The coordinator has a long experience in organising events for the communication and dissemination of science, such as Madrid's Science Week and the fair 'Madrid for Science' organised between 2000 and 2008. They cooperate with a network of entities involved in research which is strengthened through the participation in each new event, including the Night.

The Night has two main new features, when compared to other similar events:

- The fact that is happening simultaneously in many cities, in Spain and at European level;
- The focus on researchers.

These two elements have brought new challenges for the coordinator and can potentially lead to an improved capacity to coordinate with events in other cities; and to engage researchers to participate in events. The coordinator is currently trying different options to tackle these challenges.

Regarding **coordination with events in other cities**, they have tried to link activities in two cities through skype in the past but this has proven to be technically challenging. The coordinator considers that it would be interesting to have some more funding for them to be able to visit other cities in the country where the event is also taking place, as a way of strengthening cooperation between coordinators.

The coordinator has also faced some challenges to **involve MSCA fellows**. For instance, in the pre-event 'meet the fellow' the coordinator contacted 100 researchers and only managed to involve 29. This is due to the fact that many are travelling, but they believe that there may also be a lack of interest, as the date of the event is determined a long time in advance. The coordinator believes that the European Commission could do more to incentivise the participation of fellows in Night.

Another aspect mentioned by the coordinator is the **limited ability of some fellows to communicate with students and the general public**. The coordinator tries to support those fellows who have more difficulties in defining what they will present in Night. For instance, it insists on the importance of including some practical activities to engage participants. However, the coordinator mentions that this is very time consuming for them.

The evaluation report of the 2015 European Researchers' Night collected information on the **satisfaction with the event among researchers**, through a questionnaire. Interestingly, they highlighted as particularly rewarding their interaction with children

(see how they enjoy the activities, how they react to the experiments, etc.). They also enjoyed communicating with the general public.

Based on ICF observations, participating fellows and researchers appeared very motivated and interested in sharing their experiences with the public. They spent a long time discussing their research findings with the public, and continuously interacted with public of different ages.

Impacts at the participant level

From the interviews conducted, it seems that many **participants are people with a previous interest in science**. This is confirmed by the evaluation report of the 2015 European Researchers' Night that collected information on participants based on surveys and face-to-face interviews. In 2015, 92% of participants reported an interest in science.

Some of the interviewed young participants (at secondary school age) had a previous interest in studying a science career. In this case, they often attend the activities to look for further information on the available options. The 2015 evaluation report reaches similar conclusions: 40.5% of those responding to the survey – who were not already researchers – mentioned that they would like to follow a scientific career, and this interest was higher in the case of young people between 16 and 21 years-old who have not yet enrolled in tertiary education.

At younger ages it is difficult to assess the interest in science. Primary school children interviewed mentioned a general interest in the topics related to science, but had few comments on their future career. Many said that they did not know what they would like to do in the future. One boy mentioned 'if I don't get to be a football player, I might follow a career in science'.

The 2015 evaluation report informs of a greater interest in science among children (younger than 18 years-old), with 80% showing an interest or high interest in being a researcher in the future. In fact, the most enthusiastic were those under 9 years of age. The report notes that this is probably due to the influence of having met scientists as part of the activities just before answering the survey.

Participants reported their satisfaction about the new things they had learned about different topics and about researchers' work, in the activities. However, **it is not possible to judge if the event drove any of the assistants to change their opinion about science or careers in science**. Several commented that activities as the ones developed during the Night can be of great value in particular for young people who are still deciding on their future career. They observed for instance that these activities 'can help (young people) focus' but 'should be taken to schools' or 'further disseminated'.

The coordinator commented that it is also not possible for them to know if the Night contributed to attracting young people to scientific careers. They would need follow-up data which would be quite difficult to collect. However, they have observed an **increase in the number of young people participating in the event since 2010**, which might have a long-term impact in the number of students opting for scientific careers.

As for **dissemination activities**, the coordinator mentioned that they have sent the leaflet of the event to all the schools in the region, and have created the contest of poetry and science as a way to attract more school students to the event.

The event has had a greater impact in media when compared to previous years. It was on the night news programme of the first national TV public chain, and in the regional chain. The coordinator gave 14 interviews on the radio, and the national written press also referred to the event.

The coordinator believes that it could be good to have more merchandising to distribute among participants but for this they would need more funds.

A4.5.3 NIGHT case study – Creativity (France)

A4.5.3.1 Introduction

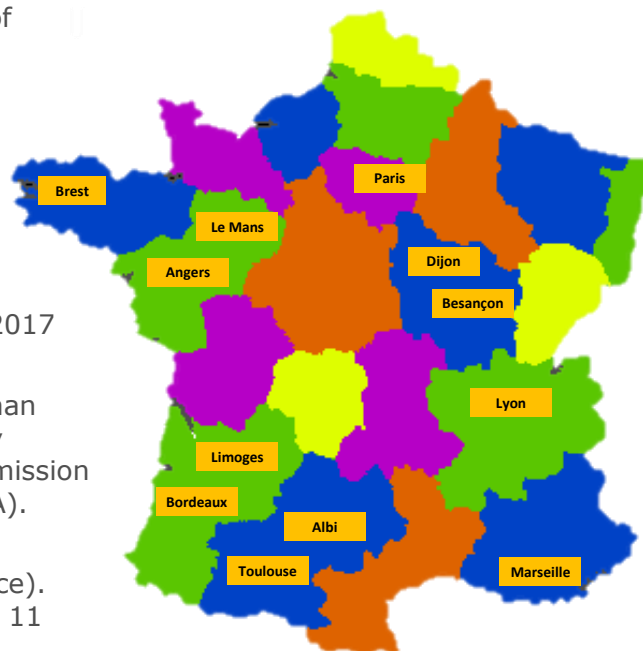
'Creativity' was first launched in May 2016, with the aim to foster greater interaction between the general public and researchers and, in the process, stimulate creative thinking that is relevant to the advancement of research and science²⁷³. The project is due to finish in November 2017.

Over the course of the two years, 'European Researchers' Nights'²⁷⁴ will be organised in 12 major cities in France (as depicted in the adjacent figure)²⁷⁵. These events will comprise a number of different activities and discussions organised around specific themes, notably: "Ideas" in 2016 and "Impossible" in 2017 (CORDIS, 2016).

The project has secured budget worth more than EUR1.1 million, of which about 35% (or nearly EUR418,000) is funded by the European Commission via the Marie Skłodowska-Curie Actions (MSCA).

The project 'Creativity' is coordinated by the University of Burgundy, located in Dijon (France). The coordinating team is assisted by a total of 11 partnering organisations, namely:

- Université de Franche-Comté;
- Centre de Culture Scientifique et Technique d'Angers (Terre des Sciences);
- Association Cap'Sciences (Centre de Culture Scientifique Technique et Industrielle Bordeaux-Aquitaine);
- Brest'Aim SA;
- Université du Maine;
- Fondation Partenariale de l'Université de Limoges;
- Communauté d'Université et Établissements Lyon;
- Université d'Aix Marseille;
- Association Traces;
- Université de Lorraine; and
- Université Fédérale de Toulouse Midi-Pyrénées.



²⁷³ Sources: European Commission (CORDIS). Please see: http://cordis.europa.eu/project/rcn/204220_en.html;

ICF consultation with the University of Burgundy, France

²⁷⁴ 'European Researchers' Night' (ERN) and 'Night' are used interchangeably

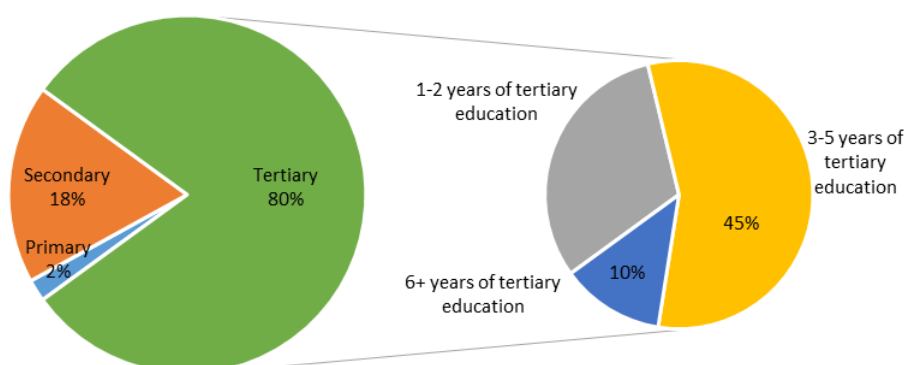
²⁷⁵ Nuit des Chercheurs website. Please see: <http://www.nuitdeschercheurs-france.eu/>

Project purpose and target audience(s)

The 'Creativity' project is seen as "a useful medium for knowledge transfer between the scientific community and the general public²⁷⁶." As such, the associated 'Night' events facilitate dialogue on a variety of scientific discoveries and/or technological innovations through an interactive approach, mainly comprising experimental and tutorial-style exhibits. In addition to seeking to raise public awareness about advancements in research and science, the 'Night' events are intended to be equally enriching for researchers. As such, researchers are able to engage with their research counterparts (from France or other EU Member States) over their experiences which can open new collaborative possibilities in their respective areas of expertise.

It is also expected that, through the aforementioned activities, the 'Creativity' project can help boost the attractiveness of the research and/or scientific profession. Though the associated Night event is targeted at people from all walks of life, much effort is devoted to attracting younger audiences. The aim is to familiarise younger audiences, such as students, with research and science as well as potential careers in these fields. Data on attendance levels at 'Night' events across the different cities for 2015 indicate that about 20% of attendees were young children and teenagers, still enrolled in school (Figure 42).

Figure 42. Participants at the 2015 Night events (France), by level of education



Source: ICF (adapted from statistics provided by the University of Burgundy)

A4.5.3.2 Set-up and added-value

Administration of the NIGHT project

The coordinator was generally positive about the process of applying for funding via the NIGHT action. In comparison to administrative procedures surrounding national programmes (such as the 'Programme d'Investissements d'Avenir' (PIA) / Investments for the Future Programme), the process of securing funding via the MSCA was regarded as more straightforward. Adequate advice and support were offered which helped limit undue obstacles as part of the application process.

The coordinator held similar views as regards post-approval project administration, though the initial contract award stages were judged overly time-consuming.

"In early stages of the award, it took time to get the project started. Upon approval, we were required to ensure that a lead contact point was elected on behalf of each of our partners. Their role would be to perform administrative / contractual duties associated with the project. Other post-award requirements included having to put in

²⁷⁶ ICF consultation with the University of Burgundy, France

place electronic signatures for each contact point at every partnering institution. All of these requirements slowed down the process of implementing the project.”

[Representatives of the coordinating team at the University of Burgundy]

Added-value of NIGHT funding

While there are other events that seek to promote scientific research at national level (e.g. the ‘Science Festival’ / ‘Fête de la Science’), the ‘Night’ events were seen to constitute a better approach to engaging with the general public. The coordinator explained that national events tend to be overly focused on “crowd size,” leading to over-subscription. There is thus reduced opportunity for interaction between researchers and attendees. The ‘Night’ events, on the other hand, lay greater emphasis on people’s learning experiences. Targets set for crowd size are thus less ambitious to ensure that attendees benefit from “an interactive and more relaxed experience.”

“We want a lot of people to come to the Night events but we don’t want excessively big crowds either. The events seek to facilitate discussions between researchers and attendees – the events would not serve their purpose if we aimed for 200 – 300 people per researcher for each activity. It would not be any different from a YouTube video being viewed by hundreds of people at home.”

[Representatives of the coordinating team at the University of Burgundy]

In 2015, more than 24 500 people attended the ‘Night’ events across France²⁷⁷. Nearly 990 researchers took part, implying, on average, small groups of up to 25 attendees for each activity hosted by a researcher. In 2016, the number of attendees and researchers rose to 27 000 and nearly 1 100 respectively²⁷⁸.

A4.5.3.2 Set-up and added-value

Overview of the project delivery

The 2016 ‘Night’ events were organised around the theme “Ideas”, i.e. how ideas are born, how researchers develop them into meaningful research, and how they are spread across society. The coordinator explained that themes are selected on the basis of the extent to which they:

- “stand out” from those chosen for other national events; and
- promote various aspects of a researcher’s or scientist’s daily working life.

Across the different cities, ‘Night’ events encompassed a variety of activities that encouraged researcher-to-attendee (and attendee-to-attendee) interaction. The table below sets out popular activities organised as part of 2016’s ‘Night’ events.

²⁷⁷ Statistics provided by the coordinator (University of Burgundy)

²⁷⁸ Statistics provided by the coordinator (University of Burgundy)

Typical 'Night' activities

- Panel discussions / roundtable discussions / live debates
- Radio broadcasts
- Poster sessions / researchers' stalls
- Face-to-face chats with researchers / speed networking / speed searching
- Live demonstrations/experiments
- Workshops/breakout sessions/interactive group sessions
- Kid's corner
- Scientific/research games (e.g. word of mouth)



Source: La Nuit des Chercheurs official webpage

Some of the biggest cities in France were selected to host a 'Night' event. In each city, various institutions formed partnerships and provide co-financing for the 'Night' events. The largest contributing partners were universities and regional councils²⁷⁹.

Assessment of delivery

Based on feedback available to date, the 'Night' events appear to be generally well-received by attendees.

In relation to the events run in 2015, the majority of attendees felt that they were "useful," "enriching" and "an effective means of discovering and learning about science"²⁸⁰. Further evidence indicates that, on average, attendees took part in three different activities over the course of the night and were able to engage and discuss with three to four researchers. The overall score (across the 'Night' events) attributed by attendees was 8.2 out of 10. About 84% of attendees indicated that they would attend a 'Night' event again in the future.

Box 7: 2016 'Night' event in Paris

The 2016 edition of the European Researchers' Night in Paris was hosted by the 'École Supérieure de Physique et de Chimie Industrielles' (ESPCI). Feedback gathered during the event by a researcher from the MSCA evaluation team indicates that most participants were very satisfied with the event, including its facilitators, speakers and researchers. Attendees were generally praiseworthy of the following activities and aspects of the event:

- Researchers' stands;
- Roundtable discussion and radio broadcast;
- Interactive Q&A sessions;
- Live demos;
- Breadth of science-related topics/themes covered;
- Sector coverage (from lab experiments to commercialisation);
- One-to-one interaction with researchers; and
- Group sessions.

A smaller number of participants, on the other hand, felt that some of the topics covered were fairly complex and potentially more suited to people who are equipped with advanced scientific

²⁷⁹ ICF consultation with the University of Burgundy, France

²⁸⁰ Statistics provided by the coordinator (University of Burgundy)

knowledge and/or related work experience. Nonetheless, these participants still felt that the event provided a fruitful learning experience.

Overall, most participants would recommend the event and are planning to attend future events.

A4.5.3.4 Impacts of the Night project

Impacts at the organisational level

The 'Creativity' project presents various benefits to the coordinating organisation. It constitutes an opportunity for researchers to present / disseminate their results to a wider audience. This also enables researchers to improve their presentation skills for better public speaking, especially at other events organised by the coordinator. As such, the coordinating organisation hosts several seminars each year. These seminars are targeted at smaller audiences, typically ranging between 200 and 300 people, and offer a platform where people can gather and exchange on various scientific topics.

The coordinator also highlighted the importance of the 'Night' events in furthering networking and/or collaborative opportunities among researchers. With regard to the coordinating organisation (i.e. the University of Burgundy), six to seven scientific projects were initiated by researchers who had met at 'Night' events.

Moreover, the 'Night' events have allowed other research methods to be tested, notably the "Great Participatory Experiment." The 'Night' events allow the experiment to be run at the same time in various locations on different subjects. Members of the public have the opportunity to participate directly in research and discover "science in the making"²⁸¹. Research in any discipline of science – natural, human, social, etc. – can be selected. This approach was first tested in 2015 and was the first ever tried across the world. There are plans to renew the experiment in 2017²⁸².

The "Great Participatory Experiment" is particularly helpful to "experimental researchers" who seek to acquire a better understanding of how people behave when put in particular situations that have a direct impact on their lives.

Impacts at the participant level

Early evidence indicates that about 27 000 people attended the 2016 'Night' events across France. Attendance levels are however not available for each participating city.

In Paris, most attendees interviewed were praiseworthy of the event. Key reasons for attending the 'Night' event included: (1) curiosity; (2) a general interest in the subject matter; and (3) a general interest to learn about what researchers do. For a few others, the event was "just another family outing."

In general, most of the participants interviewed felt that the event had met their expectations. They found the event to be "enriching," in that they got to learn about "various scientific breakthroughs." For a few others, the event also constituted a networking opportunity, whereby they were able to engage with researchers and enquire about potential career prospects.

When asked about whether the event had changed their views on the benefits of research and science to society, only a few participants responded in the affirmative. For the rest, they explained that they already hold positive views as regards science and its impacts. Consequently, the event did not specifically influence their perceptions of or attitudes towards research and science.

²⁸¹ ICF consultation with the University of Burgundy, France
²⁸² European Commission (CORDIS).
http://cordis.europa.eu/project/rcn/204220_en.html

Please see:

Most of the participants interviewed recognised that the event had successfully promoted careers in science. However, few participants indicated that the event had changed their views on the attractiveness of a career in research and science, largely because most of the interviewees:

- are currently employed in fields, other than research and science (e.g. literature, arts, social sciences, etc.);
- are currently enrolled on scientific courses at university and, consequently, their willingness to start a career in research or science pre-dates the 'Night' event; or
- are retired.

Given that the aforementioned findings are based on interviews with a small sample of participants, additional data is required in order to draw definitive conclusions as regards the impact(s) of the 'Night' events on attendees, including their attitudes towards research and science and related careers.

A4.5.4 NIGHT case study – SCIENCE UNCOVERED

A4.5.4.1 Introduction to the NIGHT project

SCIENCE UNCOVERED builds on the experience of the Natural History Museum in delivering NIGHT events since 2010. The project is coordinated by the Natural History Museum (NHM) in London. The main objectives of SCIENCE UNCOVERED are to:

- Break down public stereotypes about researchers and their work;
- Create greater public awareness of the value of science and researchers to society;
- Inspire a new generation of young researchers and students and demonstrate possible career paths in science;

SCIENCE uncovered involved a number of new delivery partners, such as the Wellcome Trust, the Natural Environment Research Council (NERC) and the Department of Business, Innovation Skills, and thus allowed to increase the diversity of topics covered compared to the preceding projects.

The project included ten events taking place across five locations in the UK (London, Tring, Manchester, Newcastle and Belfast) in 2016 and 2017. These events are expected to be attended by around 20,000 participants. For the first time in the series of projects, the 2016-17 edition included events at the Grath North Museum in Newcastle as well as the Ulster Museum in Belfast – the coordinator hopes that this will allow engaging with new public audiences in regions where currently there are little opportunities for the broader public to engage with research are relatively limited.

Set-up and added value

Each event included a mix of engagement activities, ranging from individual lectures to more interactive formats like mobile labs that visitors were instructed to use, themed science stations which introduced individual areas of research or projects, and Q&A sessions with lead investigators. When compared with previous editions, new activities introduced in SCIENCE UNCOVERED for 2016-17 include:

- Storytelling workshops - researchers' tales of life in the field and first-hand accounts of scientific expeditions;
- Battle of the wits – knowledge/game show style events;
- Late in the lab; and
- Pop-up performances by scientists

At the NHM alone, the 2016 event attracted around 7,000 participants in 2016. This was slightly less than the previous year. The coordinator voiced concern that with each year, it becomes more challenging to draw in visitors to the event.

The overall theme of the event focussed on how research is helping to face future societal challenges, and presenting tales and knowledge about natural history. This included for example the following activities:

- Beyond our shores: the bloodworm venom's importance to the fishing industry, the surprising role of algae in the ecosystem, and inviting participants to watch NHM's conservators at work on our blue whale skeleton;
- Beneath our feet: from earthworms processing soil and protecting mankind from environmental hazards, to the elements that are used in transportation and technology;

- Lost worlds: presenting the fossilised remains of ancient woolly rhinos, bears and hyenas, and what they show about the changing climate on the planet today.

Administration of the NIGHT project

The coordinator was of the view that the application process is straightforward, and the experience of having run the NIGHT event since 2010 was very beneficial to ensure effective setup of the current edition.

As regards administrative effort beyond the initial application for funding, the coordinator felt that the European Commission is efficient and helpful in supporting beneficiaries, and is quick to turn around questions or circulate necessary advice and guidance documents.

The flash questionnaire that is required shortly after each event can be challenging to submit in time. Especially if there is more than one partner involved, collecting the data can take more time than the current deadline of one working day allows.

The added value of NIGHT funding

With the evidence at hand, the added value of the EU funding is difficult to make out for the NHM, however this might be different for other locations involved in the project. Interviewees confirmed that the NHM runs various similar events a year, such as a daily public programme²⁸³, monthly evening events²⁸⁴. Furthermore, various UK organisations hold or fund similar science outreach events.²⁸⁵

Whilst the project self-evaluation review the outcomes achieved and the satisfaction of participants, it does not investigate the added value of the NIGHT sponsored events.

A non-representative participant survey conducted by ICF at the NHM South Kensington during the NIGHT 2016 event indicated that

- The vast majority of participants have a strong interest in science and research already or work in research themselves;
- School students and classes attending benefit strongly from the various NIGHT activities, and might find larger added value in the specific NIGHT activities than other participants with already strong interest in research and science.

Overall the added value, in particular with view towards similar activities carried out by the NHM itself and other institutions, is difficult to assess.

A4.5.4.3 The delivery of the NIGHT project

Overview of project delivery

Whilst the project is coordinated by the NHM, it involves a large number of partners.

- Partners providing cash and match funding are the London borough of Kensington & Chelsea as well as the UK government;
- Partners providing event sites and staff resources include the Manchester Museum, the Ulster Museum in Belfast and the Great Northern Museum in Newcastle;

²⁸³ <http://www.nhm.ac.uk/visit/whats-on/day.html> [accessed 12th January 2016]

²⁸⁴ http://www.nhm.ac.uk/visit/exhibitions/lates.html?utm_source=short-url&utm_medium=short-url&utm_campaign=lates [accessed 12th January 2016]

²⁸⁵ For instance the British Academy of Science and the Royal Society's summer exhibitions.

- Partners providing staff resources include the Imperial College London, the British Council, the Centre for Ecology and Hydrology, Royal Veterinary College, London Metropolitan Police, Cranfield University, John Innes Centre, Royal Botanical Gardens, Centre for Human Genetics, Cambridge Stem Cell Institute, Centre for Mitochondrial Disease, and the Cobalt Development Institute.

The event was clearly distinguishable from the 'standing activities' at NHM, occupying additional space and science stations throughout the exhibition area. Signposting and programme leaflets pointed participants to individual points of interest or events.

There were parts of the event which were clearly tailored to specific audiences, such as exploratory events tailored to school students and younger children.

Overall, the event was well delivered – and garnered a substantial number of additional visitors to what could be expected on a regular Friday afternoon.

A4.5.4.4 Impacts of the NIGHT project

Impacts at the organisational level

From interviews with the coordinator and a review of project documents, impacts at the organisational level mainly relate to the newly added project partners in Newcastle and Belfast. These locations benefitted from the additional EU funding and have been able to expand their public outreach activities.

For the NHM in London, it is less clear what the impacts of the project have been so far beyond the additional funding received.

Impacts at the participant level

The self-evaluation of the 2016 event suggests that visitor satisfaction overall has been very high, with 95% of visitors at the South Kensington venue rating the event as good or excellent. Further impacts that the self-evaluation found in 2016 include:

- Resolving scientist stereotypes and giving an insight into the diversity of scientists;
- Increasing knowledge of the benefits of science to society (75% of visitors reported that the event had increased their understanding of societal benefits of science);
- Increased understanding of the diversity of careers open in science;
- Encouragement to pursue scientific careers or qualifications – teachers of school classes attending the SCIENCE UNCOVERED events highlighted that their students found inspiration at the event and at a self-evaluation in Manchester, 70% of A level students said that the event has increased their interest in pursuing a scientific career;
- Knowledge about the natural world, with the majority of respondents to a self-evaluation in 2013 stating that they had gained knowledge of natural history (however only 11% of visitors stated this as their 'highlight' of attending the event)
- Entertainment – in 2015, 33% of visitors stated that their main take away of the event was a 'good time with friends' at a 'cool and interesting place', suggesting that enjoyment is a central feature of the NIGHT events.

Some of the observed impacts can be at the individual level can be linked back to the overall objectives of the NIGHT programme, whilst some others are more in line with a modern museum experience and do not hold any specific value for achieving the two

main objectives of NIGHT projects (raising interest in scientific careers and improve the public understanding and recognition of science's societal value and impact).

Furthermore, some impacts in particular on young people's perspective on science could be seen further down the line, as there was a substantial number of families and school students attending the events in 2016 and 2015.

Overall, the NIGHT event 2016 at the NHM was of high quality and well delivered. However it was difficult to identify specific impacts of NIGHT funding, as opposed to what the NHM and partner organisations would have offered anyway.

Annex 4 Data tables from survey

A5.1 Effectiveness

This Annex contains tables presenting detailed insights from the online surveys related to the Effectiveness section (section 4 above).

Table 72. Share of fellows surveyed who indicate to have acquired skill to a large or very large extent (in%), by action

Please indicate to what extent you have acquired skills in the areas below during your MSCA fellowship	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Presentation skills, public speaking and communication	51.8%	64.4%	75.1%	56.3%	66.3%
Interdisciplinary techniques	45.2%	52.1%	52.1%	54.2%	51.4%
Publishing	50.9%	57.9%	49.5%	41.2%	51.0%
Use of specialised equipment	39.1%	47.5%	55.9%	38.6%	48.8%
Languages	44.9%	43.0%	51.9%	49.1%	48.0%
Research data management	38.9%	51.2%	49.3%	43.4%	47.6%
Project management	40.8%	61.2%	36.1%	41.5%	44.6%
Research ethics	32.2%	35.8%	47.1%	34.1%	40.1%
Proposal and report writing	45.3%	62.5%	20.7%	29.1%	37.1%
Training and supervision of students	34.6%	50.2%	25.8%	32.5%	34.8%
New and/or advanced scientific methods	31.6%	33.6%	34.8%	35.1%	34.0%
Open science (open access, etc.)	23.7%	29.2%	39.5%	27.5%	32.7%
Gender aspects	20.3%	21.4%	26.7%	22.5%	23.7%
Intellectual property rights	16.9%	19.3%	26.3%	25.6%	22.9%
Human resource management, leadership and line management	11.2%	19.1%	10.0%	26.6%	14.9%
Entrepreneurship	10.2%	10.1%	18.3%	18.8%	14.9%
Product development	8.0%	8.1%	16.2%	25.8%	14.0%
Marketing and sales	3.7%	3.6%	6.7%	10.7%	5.9%
N	807	1 588	2 489	738	5 622

Figure 43. Responses by skill acquired to a (very) large extent during fellowship (only fellows): Type of training

Row Labels	Training/ taught course at my host institution	Training/ taught course at another institution	Workshop, seminar, conference	Secondment/ placement in business	On the job training, coaching, peer- learning	On-line e- learning	Grand Total
Entrepreneurship	260	132	254	61	141	49	897
Event organisation (e.g; seminar, conference, science festival)	646	160	529	73	604	54	2066
Gender aspects	537	139	325	55	315	123	1494
Grant and proposal writing	860	196	432	41	914	144	2587
Human resource management, leadership and line management	284	186	136	26	251	58	941
Intellectual property rights	359	132	299	47	168	93	1098
Interdisciplinary techniques	1065	628	1094	402	939	251	4379
Knowledge of Intellectual Property Rights (IPR)	306	120	278	52	91	74	921
Knowledge of other research disciplines	1149	746	1556	496	971	377	5295
Languages	1269	622	582	276	866	353	3968
Marketing and sales	88	42	80	21	46	22	299
New and/or advanced scientific methods in your research field	2003	1030	1840	737	1751	559	7920
Open science (open access, etc)	785	204	378	76	502	251	2196
Presentation skills, public speaking and communication	1648	650	1822	283	1436	213	6052
Product development	221	90	152	79	148	45	735
Project management	934	276	452	125	1041	142	2970
Publishing	1237	297	567	108	1243	178	3630
Research data management	1126	312	433	165	988	261	3285
Research ethics	1047	270	493	102	634	207	2753
Team management and leadership skills	352	127	239	75	226	39	1058
Training and supervision of students	868	151	145	32	906	46	2148
Use of specialised equipment	1413	563	399	443	1030	171	4019
Grand Total	18457	7073	12485	3775	15211	3710	60711

Note: Colour code indicates frequency of type of training reported by fellows by skill. Multiple answers were possible.

Table 73. Responses by action: Shares of respondents who would have liked more training in a certain area (in%), sorted by share total share

Where there any areas in which you would have liked more training?	COFUND	IF	ITN	TOTAL
Report and proposal writing	27.1%	20.5%	32.7%	28.0%
New and/or advanced scientific methods	22.4%	20.6%	31.5%	26.7%
Project management	23.9%	19.2%	25.2%	23.1%
Team management and leadership skills	22.6%	18.6%	20.3%	20.2%
Publishing	17.3%	12.2%	23.0%	18.7%
Interdisciplinary techniques	16.5%	14.8%	21.1%	18.5%
Training and supervision of students	15.8%	13.2%	18.6%	16.5%
Knowledge of other research disciplines	12.4%	11.4%	17.7%	15.0%
Use of specialised equipment	11.6%	11.1%	17.7%	14.7%

Where there any areas in which you would have liked more training?	COFUND	IF	ITN	TOTAL
Research data management	13.5%	11.0%	15.1%	13.6%
Entrepreneurship	8.7%	9.1%	17.4%	13.5%
Languages	11.8%	8.6%	15.0%	12.5%
Presentation skills, public speaking and communication	14.4%	10.5%	11.4%	11.6%
Product development	6.8%	6.4%	15.3%	11.2%
Human resource management, leadership and line management	9.8%	9.1%	12.1%	10.8%
Knowledge of Intellectual Property Rights	9.8%	8.8%	10.0%	9.6%
Open science (open access, etc)	6.6%	7.3%	9.2%	8.2%
Marketing and sales	4.5%	3.9%	11.0%	7.8%
Research ethics	6.1%	4.1%	6.4%	5.6%
Gender aspects	3.9%	4.4%	4.7%	4.5%
N	805	1 577	2 723	5 105

Table 74. Responses by action (only fellows): What is your current employment status?

What is your current employment status?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Grand Total
Employed	88.2%	92.6%	75.6%	95.5%	87.2%
Out of the labour force (maternity or parental leave)	1.4%	0.5%	1.3%	0.2%	0.8%
Out of the labour force (other reasons)	0.7%	0.4%	1.4%	0.8%	0.9%
Out of the labour force (retired)	0.7%	0.4%	0.0%	0.2%	0.2%
Self-employed	2.1%	1.9%	2.2%	1.2%	1.8%
Unemployed	6.9%	4.3%	19.5%	2.2%	9.1%

What is your current employment status?	COFUND	IF	ITN	RISE / IAPP / IRSES	Grand Total
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%
N	288	797	837	598	2 539

Note: Question was only asked to respondents for which the end of the fellowship was before or equal to date "07/31/2016", allowing for a transition phase of approximately 4 months.

Table 75. Share of organisations providing formal/informal training (%), by action, sorted by total share

Has/will your organisation provided/provide formal or informal training in the following areas to the MSCA fellows?	COFUND	IF	ITN	RISE / IAPP / IRSES	Total
Presentation skills, public speaking and communication	66.0%	74.9%	86.5%	78.2%	79.8
Publishing	66.0%	73.4%	79.5%	72.1%	75.4%
Proposal and report writing	67.9%	74.6%	75.5%	52.1%	70.9%
Interdisciplinary techniques	58.5%	65.8%	72.2%	77.5%	70.1%
New and/or advanced scientific methods	58.5%	75.3%	82.4%	5.8%	65.2%
Training and supervision of students	41.5%	65.8%	60.0%	75.2%	64.8%
Project management	56.6%	66.6%	62.9%	62.8%	64.3%
Use of specialised equipment	50.9%	57.4%	67.0%	70.1%	63.2%
Research data management	49.1%	54.8%	59.0%	64.2%	58.0%
Research ethics	64.2%	55.7%	59.3%	53.8%	56.9%
Languages	49.1%	52.0%	62.7%	56.1%	56.8%
Intellectual property rights	58.5%	44.7%	57.2%	42.5%	49.4%
Open science (open access, etc)	56.6%	48.0%	48.8%	53.3%	49.4%
Gender aspects	50.9%	40.0%	38.0%	43.7%	40.1%
Entrepreneurship	47.2%	25.4%	45.2%	36.0%	35.3%

Has/will your organisation provided/provide formal or informal training in the following areas to the MSCA fellows?	COFUND	IF	ITN	RISE/IAPP / IRSES	Total
Human resource management, leadership and line management	30.2%	37.6%	27.7%	38.5%	33.8%
Product development	18.9%	16.0%	32.6%	44.0%	27.4%
Marketing and sales	5.7%	6.7%	14.7%	17.5%	11.6%
N	53	1 127	1 031	471	2 682

Note: For RISE/IAPP/IRSES, only organisations who provided/ provide training as part of the staff exchange were asked to respond to this question.

Table 76. Responses by action: Share of organisations providing training in a specific area which provide it exclusively to MSCA fellows

What specific training is only available to MSCA fellows?	COFUND	IF	ITN	RISE/IA PP/ IRSES	Total
Product development	10.0%	11.7%	19.9%	32.2%	21.3%
Marketing and sales	33.3%*	8.0%	22.4%	27.2%	20.3%
Entrepreneurship	16.0%	8.7%	19.1%	27.1%	17.3%
Use of specialised equipment	3.7%	8.2%	16.2%	37.0%	17.0%
Interdisciplinary techniques	12.9%	9.6%	15.5%	34.3%	16.8%
Project management	13.3%	9.2%	17.8%	30.3%	16.1%
Presentation skills, public speaking and communication	11.4%	8.1%	16.0%	30.7%	15.4%
Languages	11.5%	7.9%	15.3%	30.3%	15.0%
Research data management	3.9%	8.1%	13.7%	31.9%	14.8%
Proposal and report writing	16.7%	9.0%	14.7%	30.5%	14.3%
Publishing	11.4%	7.3%	13.7%	31.4%	14.0%
Intellectual property rights	16.1%	8.7%	14.8%	24.5%	14.0%
New and/or advanced scientific methods	3.2%	9.2%	17.0%	32.1%	13.2%
Training and supervision of students	4.6%	6.5%	13.4%	26.9%	13.1%

What specific training is only available to MSCA fellows?	COFUND	IF	ITN	RISE/IA PP/IRSES	Total
Gender aspects	14.8%	6.4%	10.0%	28.7%	12.1%
Human resource management, leadership and line management	12.5%	7.3%	11.9%	22.5%	11.8%
Research ethics	8.8%	5.7%	10.3%	31.1%	11.8%
Open science (open access, etc)	3.9%	4.7%	8.1%	17.9%	8.6%

* Very low numbers (1 exclusive, 2 generally accessible trainings)

Table 77. Agreement of ITN fellows and comparison group of researchers to the statement "My supervisor(s) were leading experts in my area of work"

To what extent do you agree with the following statements: "During my doctoral studies... My supervisor(s) were leading experts in my area of work"	ITN	Comparison group for ITN researchers
To a very great extent	40.2%	45.7%
To a great extent	30.7%	27.0%
To a moderate extent	17.1%	17.0%
To a small extent	6.7%	6.9%
Not at all	4.1%	3.5%
Don't know	1.3%	0.0%
Total	100%	100%
N	2 739	348

Table 78. Agreement of ITN fellows and comparison group of researchers to the statement "My supervisor(s) were sufficiently experienced in doctoral supervision"

To what extent do you agree with the following statements: "During my doctoral studies... My supervisor(s) were sufficiently experienced in doctoral supervision"	ITN	Comparison group for ITN researchers
To a very great extent	44.8%	49.0%
To a great extent	28.3%	29.8%

To a moderate extent	15.1%	14.4%
To a small extent	6.2%	5.8%
Not at all	3.8%	2.0%
Don't know	1.8%	0.0%
Total	100%	100.0%
N	2 731	139.0

Table 79. Agreement of ITN fellows and comparison group of researchers to the statement "My thesis supervisor(s) met with me as much as I needed"

To what extent do you agree with the following statements: "During my doctoral studies... My thesis supervisor(s) met with me as much as I needed"	ITN	Comparison group for ITN researchers
To a very great extent	39.1%	46.1%
To a great extent	28.0%	25.4%
To a moderate extent	19.2%	16.4%
To a small extent	8.5%	8.9%
Not at all	4.0%	3.2%
Don't know	1.3%	0.0%
Total	100%	100%
N	2 736	346

Table 80. Responses by action (only organisations): Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?

Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Strongly satisfied	31.9%	46.3%	54.8%	36.9%	46.7%
Satisfied	21.3%	32.6%	33.4%	46.0%	36.2%
Neither dissatisfied	4.3%	3.9%	3.4%	8.3%	4.9%
Dissatisfied	2.1%	0.6%	0.9%	1.5%	0.9%

Overall, how satisfied were you /are you with the partnerships you developed as a result of your MSCA project?	COFUND	IF	ITN	RISE/ IAPP/ IRSES	Total
Strongly dissatisfied	2.1%	1.4%	1.1%	1.8%	1.4%
Don't know	4.3%	3.8%	1.0%	0.0%	1.8%
Not (yet) applicable	34.0%	11.4%	5.4%	5.5%	8.2%
Total	100%	100%	100%	100%	100%
N	47	1 094	1 018	743	2 902

Table 81. Share of organisations having concrete plans for future collaboration with organisations from MSCA network

Do you have any concrete plans for collaboration with (some of) these organisations in the future?	COFUND	IF	ITN	RISE/ IAPP/ IRSES
...(other) academic organisations in the country where your organisation is based?				
No	12.5%	6.7%	6.7%	6.6%
Yes fully developed	59.4%	55.3%	52.5%	34.4%
Yes in development	28.1%	37.9%	40.8%	58.9%
...(other) academic organisations abroad?				
No	9.7%	7.1%	6.3%	7.9%
Yes fully developed	51.6%	49.7%	45.8%	30.9%
Yes in development	38.7%	43.1%	47.9%	61.2%
...(other) non-academic organisations in the country where your organisation is based?				
No	8.7%	16.8%	11.7%	14.0%
Yes fully developed	47.8%	36.6%	41.0%	23.8%
Yes in development	43.5%	46.6%	47.3%	62.1%
...(other) non-academic organisations abroad?				
No	5.6%	19.6%	16.8%	19.0%
Yes fully developed	50.0%*	33.0%	28.6%	25.9%
Yes in development	44.4%*	47.5%	54.6%	55.1%

*small cell size <10 for COFUND

Table 82. Responses by action (only organisations): Did your MSCA/RISE/IAPP/IRSES proposal include plans for any of the following outputs (choose all that apply)? & Have you produced these outputs as a result of the MSCA/RISE/IAPP/IRSES project?

Did your MSCA/RISE/IAPP/IRSES proposal include plans for any of the following outputs (choose all that apply)? & Have you produced these outputs as a result of the MSCA/RISE/IAPP/IRSES project?	COFUND	IF	ITN	RISE / IAPP / IRSES	Total
Peer-reviewed scientific publications					
Share of organisations which planned output	76.0%	95.0%	94.2%	86.2 %	92.1%
Share of organisations which achieved planned output (only past projects)	85.7%	88.8%	90.9%	94.2 %	90.0%
Patent/trademark applications					
Share of organisations which planned output	42.9%	17.6%	30.4%	17.9 %	22.7%
Share of organisations which achieved planned output (only past projects)	50.0%*	55.6%	32.8%	72.7 %	44.8%
Prototype development and demonstration					
Share of organisations which planned output	21.3%	16.5%	37.4%	38.3 %	29.8%
Share of organisations which achieved planned output (only past projects)	0.0%*	80.6%	83.2%	78.3 %	80.7%
New or improved products, processes, or services					
Share of organisations which planned output	31.3%	22.7%	49.7%	46.3 %	38.8%
Share of organisations which achieved planned output (only past projects)	33.3%*	37.8%	55.4%	46.2 %	47.0%
New or improved technical codes or standards					
Share of organisations which planned output	23.4%	14.4%	25.3%	22.2 %	20.5%
Share of organisations which achieved planned output (only past projects)	66.7%*	80.0%	83.9%	57.1 %	78.9%
Clinical trials					

Did your MSCA/RISE/IAPP/IRSES proposal include plans for any of the following outputs (choose all that apply)? & Have you produced these outputs as a result of the MSCA/RISE/IAPP/IRSES project?	COFUND	IF	ITN	RISE / IAPP / IRSES	Total
Share of organisations which planned output	14.6%	3.5%	5.5%	6.6%	5.2%
Share of organisations which achieved planned output (only past projects)	100.0%*	50.0%*	58.3%*	50.0%*	57.1%*

Note: * low number of observations (<10)

Table 83. Fellows' likelihood of having followed a research career in the absence of MSCA, by action

ER: What is the likelihood that you would have continued your research career after receiving your PhD in the absence of the MSCA fellowship? ESR: What is the likelihood that you would have considered a research career in the absence of the MSCA fellowship?	COFUND	IF	ITN	Total
Very high	35.2%	36.8%	24.3%	29.9%
High	27.5%	28.3%	31.4%	29.8%
Medium	21.4%	20.5%	25.8%	23.5%
Low	7.9%	6.9%	10.8%	9.1%
Very low	3.7%	3.2%	3.9%	3.6%
Don't know	4.3%	4.3%	3.8%	4.0%
Grand Total	100%	100%	100%	100%
N	786	1 610	2 749	5 145

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